

## CHAPTER 3

### PLANT LOCATION SELECTION

#### 3.1 BENEFIT OF PLANT LOCATION SELECTION

Selecting a plant location is important to a manufacturer because of its influence on plant's revenue and costs. One reason that enhances business success is to be in the right place at the right time. There are many factors that a manufacturer has to be taken into consideration. A primary objective of plant location selection is to select the location that helps a manufacturer to gain optimized profits or minimize the cost of the product delivered to the customers. Some plant locations might have the lowest raw material cost, another have the lowest basic infrastructure cost, and another have the nearest to the market location, it depends on individual manufacturer requirements for location.

#### 3.2 PROBLEM OF PLANT LOCATION SELECTION

Although a problem of plant location selection may occur at once or never happen in a factory's life cycle because most factories do not want to move or expand their plant sites during 25 years. In fact, most factors have changed such as change of market requirements, change of transportation cost, change of labour cost, change of taxes and so on. The problem of selecting a location is occurring when a new plant is to be established or expansion at a poor location from the first day of manufacturing operation. The poor location will make high costs in business operation, production process and mistakes for developing or improving the business operation in the next time. For example, if a company locates far from the customer location and market location, the shipping often delays to transport finished goods or products to the customer because of the plant location's long distance from the market location or customer. The company may lack of a good relationship with the customer in the future because their customer has complaints about receiving finished goods with a delay. Another example, if

company was established plant location in the city, the factory has high cost cause of high tax rates, high land value and high tax bills.

### 3.3 TYPE OF PLANT FACILITIES

The type of plant facility is major consider for plant location selection. Each plant has differently factor that requires for plant location selection.

#### 3.3.1 Heavy Manufacturing

A heavy manufacturing is large plants that require a lot of plant area and has high cost to construct such as automobile plants, steel mills, concrete plant and oil refineries. Heavy plant facilities require factors including plant construction cost, location costs, modes of transportation for shipping their heavy product and receive of raw materials, Basic infrastructure, and labour supply. However, this plant may be created pollution (air pollution, noise pollution and traffic pollution) so it must be located far from the city and harm to minimize the environment.

#### 3.3.2 Light Industry

Light industry facilities are smaller, cleaner plants such as factory, which produces as electronic equipment, and components, computer products, assembled products (television). Several factors are important for heavy manufacturing, it is less important for light industry. Light industry require factors including, skill labour of light industry at the high technology, transportation for supply and distribute the finished good and raw material to the company.

### 3.3.3 Retail and Service

Most important factor of retail and service are to delivery their product and service to the customers quickly. Entrepreneur of retail or service has to consider on the market place at the first time. They would like to locate near customer to serve them or buy the goods to them. For examples of retail are department stores, groceries and service like a hotel, restaurant, bank and clinics.

### 3.3.4 Warehouses and Distribution Centers

A warehouse was built to receive, handle, store and transport products and some warehouses will provide sales support and personnel for the factory. The important factor of warehouse location is transportation facility and transportation cost based on frequency of delivery that customer requirement.

## 3.4 STEPS IN PLANT LOCATION DECISION

There are four steps in making a plant location selection decision;

- 3.4.1 To define the objectives and requirement and then select the techniques and information that relates to make decision and analysis in plant location selection in case of plastic industrial and concrete industrial.
- 3.4.2 To identify factors that are important and related to making decision and analysis in plant location selection in case of plastic industrial and concrete by using techniques, related information and questionnaires. For example, nearness or accessibility to the source of raw materials, transportation facilities, location cost.

3.4.3 To develop location alternatives, decrease some choice of plant location and identify the general province for a plant location and that help us make decision in the final plant location selection easily and quickly.

3.4.4 To evaluate the alternatives and make decision in plant location selection by select the specific location, including the study detail of that factor, brief detail for each location site being considers.

### 3.5 PLANT LOCATION SELECTION FACTORS

There are several important plant location selection factors that so important to make a plant location selection decision:

#### 3.5.1 Market Location

In manufacturing industries, market location is primary of plant location factors because of the problem of transporting the finished goods to the customer. The cost and time required for transporting the finished good or product to the customer is a major consideration for many companies. Industry has both direct and indirect relationship to market location such as in transporting the finished goods to customers or receiving some materials to the factory. For example, in concrete industries, it is high costs to ship or transport the finished goods to the customers at the long distance. If the company has fragile goods, transporting over a long distance may increase the risk of damage.

### 3.5.2 Labour Supply

The labour force is vital to operation of the business. Most factories consider labour supply in relation to the cost, availability labour supply and wage rates at the location. The minimum wage in Thailand is currently about 130-140 baht per day in rural area and 162 baht per day in Bangkok. However, an industry has to know the level of skill requirement of the employees for each industry. Some industry requires employees with high skills, some industry requires employees with certain skills, and other industries require employees with the low skills or unskilled. The wage rates are primary factor for industry. In plastic product, batch production and assembly, it considers about low cost of land and access to the labour skill.

The company has to ensure number of employees enough for them in business operation and production.

### 3.5.3 Raw Materials Location

The location of raw materials is importance because of the weight. It does not concern only reducing raw materials cost but also decreasing the amount of raw material and inventory of the factory. For example, food industry is first industry which considering requirement for the raw material location. For example, the seafood industries have to locate near raw material location cause of fish may be die before they are frozen.

### 3.5.4 Transportation Facilities

Transportation is vital way in industries to move raw materials, finished goods, products, people, and equipment to and from. The company should be located their plant in

location where provide enough transportation facilities. The cost of transport products or raw material is important factor for many companies especially in heavy industries. Transportation consists of waterways, airways and railroads, which is major main thing for industry shipping. Most industries use truck and ship to transport. In the heavy industries, concrete industry, the transportation is important factor to analyse plant location for supplying of raw materials and transporting of the products to the customers. In the steel industry, all steel mills are located on the water transportation routes. Today, there are about eight international deep-sea ports with four private ports to handle container cargo, Laem Chabang Commercial Port, Map Ta Phut Industrial Port Serve for Eastern Seaboard Region, Songkhla and Phuket Ports were established to serve and support Southern Region, and Bangkok Commercial Port (largest port).

#### 3.5.5 Utilities Facilities

A basic utility in Thailand consists of electricities, water supply, and communication system. The Electricity Generating Authority of Thailand (EGAT) responses for providing and generating power and transmission power, whereas the Metropolitan Electricity Authority (MEA) and the Provincial Electricity Authority (PEA) cooperate to distribute electricity to Bangkok and other provinces. The Metropolitan Waterworks Authority (MWA) and Provincial Waterworks Authority (PWA) are has ability to produce water about 3.72 million cubic meters per day and PWA 1.25 million cubic meters per day.

Most industries would like a great deal of electricity power, water supply, telephone service to support their requirement. Most companies require adequate amount of water supply or electric power in manufacturing process.

In plant location selection, telephone service has influences for business owners in making plant location selection decision because of telephone is a main factor of the company to communicate in and outside company.

Telephone service is responsible of The Telephone Organization of Thailand (TOT) serve for national communications and The Communications Authority of Thailand (CAT) serve for international communications and the postal services.

#### 3.5.6 Construction cost

The construction cost consists of industrial factor cost, construction wage cost and number of worker in plant construction. . It helps business owners to save cost of industry building by consideration in construction cost factor before select the new plant location selection.

#### 3.5.7 Location cost

In city, the location cost is expensive than the rural area. Most factories are located outside the city to reduce the location price and save cost. The location cost is minor factor for plant location selection however; this factor helps business owners to reduce cost of location in setting the new plant location.

#### 3.5.8 BOI investment promotion location

BOI investment promote location is related to government zoning restrictions including tax privileges, project promotion and export promotion. Business owners should consider the amount of taxed in plant location selection because of taxes have become the

part of manufacturing operation cost. In fact, local taxes, state and federal income tax are one reason for factory relocation

Each individual location has different local taxes, state and federal income tax. Factories have to pay the federal income tax from their business earning to the government in each year. Factories established in the city, it is high tax values, high tax bills and high land values compare to other location.



Table 3.1 shows data requirement in each factor that used in decision support system for plant location selection in case of plastic industry and concrete industry.

Table 3.1: Data requirement in each factor that used in decision support system for plant location selection

Factor	Data requirement
1. Nearness or accessibility to the market	<ul style="list-style-type: none"> <li>- Market location</li> <li>- Total population of each provinces</li> </ul>
2. Transportation facilities	<ul style="list-style-type: none"> <li>- Train transportation ( available, frequency of service)</li> <li>- Air transportation ( available, number of port and frequency of service)</li> <li>- Truck transportation ( available, access to the highways)</li> <li>- Water transportation ( available and number of port)</li> <li>- Mail and parcel service ( available and number of post office)</li> </ul>
3. Location cost	<ul style="list-style-type: none"> <li>- Price of location</li> </ul>
4. BOI investment promotion	<ul style="list-style-type: none"> <li>- BOI investment promotion zone</li> <li>- Local taxes</li> </ul>
5. Availability and capacity of utilities	<ul style="list-style-type: none"> <li>- Electricity ( number of users, electricity generated)</li> <li>- Water ( number of users, water production)</li> <li>- Telephone ( number of telephone lines)</li> <li>- Post and telegraph ( number of post office services, available)</li> </ul>
6. Availability of labour supply	<ul style="list-style-type: none"> <li>- Wage rates</li> <li>- number of employment</li> <li>- Location</li> </ul>
7. Nearness or accessibility to the source of raw material	<ul style="list-style-type: none"> <li>- Type of raw material</li> <li>- Raw material location</li> </ul>
8. Plant construction cost	<ul style="list-style-type: none"> <li>- Number of worker</li> <li>- Industry factory cost</li> <li>- Construction wages</li> </ul>