

The proximity to customers economics essay



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Facility location is a critical strategic level decision making process. The total revenue and costs are directly related to the location, the optimal placement of facilities is very important to minimize the operating costs, reduce transportation costs, overcome the competition, provide proper service to customers, etc.

The selection of location is a key as large investments are made in a facility and frequent change of location is not possible. The selection of location should be based on long term plan; other expansion needs to be considered while screening the locations. It should meet the company's long term vision, mission and its policy

Once the importance of location of facilities is known the next question arises " Where should a facility be located?" This is a top question in front of strategic business managers of current firms, particularly in the age of globalization and foreign direct investments. Many changes are made in industrial policies for the benefit of overall country growth thus allowing the companies greater reach to customers and flexibility in choosing their locations. In real scenario, the choice is based on these two important points

Locating the facility close to the customer due to competition, trade agreements, and shipping costs.

Locating the facility near the labor pool to take advantage of low wage costs and high technical skills.

Factors affecting the facility location

The international facility location decisions are guided by many factors which affect the operation in one or more ways. Some of the important factors are listed below

Proximity to Customers

Example: Japan's NatSteel Electronics has built its two largest plants in Mexico and Hungary to be closer to major markets in the United States and Europe-whose buyers want their goods delivered yesterday. Such proximity also helps ensure that customer needs are incorporated into products being developed and built.

Business Climate A favorable business climate can include the presence of similar-sized businesses, the presence of companies in the same industry, and, in the case of international locations, the presence of other foreign companies. Probusiness government legislation and local government intervention to facilitate businesses locating in an area via subsidies, tax abatements, and other support are also factors.

Total Costs The objective is to select a site with the lowest total cost. This includes regional costs, inbound distribution costs, and outbound distribution costs. Land, construction, labor, taxes, and energy costs make up the regional costs. In addition, there are hidden costs that are difficult to measure. These involve excessive moving of preproduction material between locations before final delivery to the customers and loss of customer responsiveness arising from locating away from the main customer base.

Infrastructure Adequate road, rail, air, and sea transportation are vital.

Energy and telecommunications requirements also must be met. In addition, the local government's willingness to invest in upgrading infrastructure to the levels required may be an incentive to select a specific location.

Quality of labor The educational and skill levels of the labor pool must match the company's needs. Even more important are the willingness and ability to learn.

Suppliers A high-quality and competitive supplier base makes a given location suitable. The proximity of important suppliers' plants also supports lean production methods.

Other facilities The location of other plants or distribution centers of the same company may influence a new facility's location in the network. Issues of product mix and capacity are strongly interconnected to the location decision in this context.

Free Trade Zones A foreign trade zone or a free trade zone is typically a closed facility (under the supervision of the customs department) into which foreign goods can be brought without being subject to the normal customs requirements. There are about 170 such free trade zones in the United States today. Such specialized locations also exist in other countries.

Manufacturers in free trade zones can use imported components in the final product and delay payment of customs duties until the product is shipped into the host country.

Political Risk The fast-changing geopolitical scenes in numerous nations present exciting, challenging opportunities. But the extended phase of transformation that many countries are undergoing makes the decision to locate in those areas extremely difficult. Political risks in both the country of location and the host country influence location decisions.

Government Barriers: Barriers to enter and locate in many countries are being removed today through legislation. Yet many non legislative and cultural barriers should be considered in location planning.

Environmental Regulations: The environmental regulations that impact a certain industry in a given location should be included in the location decision. Besides measurable cost implications, these regulations influence the relationship with the local community.

Host Community The host community's interest in having the plant in its midst is a necessary part of the evaluation process. Local educational facilities and the broader issue of quality of life are also important.

Competitive advantage An important decision for multinational companies is the nation in which to locate the home base for each distinct business. Porter suggests that a company can have different home bases for distinct businesses or segments. Competitive advantage is created at a home base where strategy is set, the core product and process technology are created, and a critical mass of production takes place. So a company should move its home base to a country that stimulates innovation and provides the best environment for global competitiveness. ¹ This concept can also be applied to domestic companies seeking to gain sustainable competitive advantage. It

partly explains the southeastern states' recent emergence as the preferred corporate destination within the United States (that is, their business climate fosters innovation and low-cost production).

Plant Location Method:

The below diagram summarises the set of decisions that a company must make in choosing a plant location.

Source: T. M. Carroll and R. D. Dean, "A Bayesian approach to plant-location decisions,"

Evaluation of alternative regions, subregions, and communities is commonly termed macro analysis. Evaluation of specific sites in the selected community is termed micro analysis. Techniques used to support macro analyses include factor-rating systems, linear programming, and centroid method. A detailed cost analysis would accompany each of these methods, and they must, of course, be related to business strategy.

Facility location model or techniques

The following facility location models are discussed in detail below

Factor Rating Method

Weighted factor rating method

Break even analysis technique

Linear Programming – Transportation model

Centroid or Center of Gravity Method

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a. Factor rating method:

This method is frequently and most widely used to find the location alternatives because they provide a mechanism to combine diverse factors in an easy to understand format and provide consistency of judgment about the location alternatives

Following are the steps involved in selecting a new location using this method:

Identify and list down the important and relevant factors

Each factor should be rated according to its relative importance

Each site should be rated in corresponding to the factor

To get the total site score, the factor rating is multiplied by the each site rating and the products to be added for getting total score

Example:

The important location factors are given as input in column 2 of below shown table, then the factor rating is given in the scale of 1 to 10 (very low to very high) and corresponding location rating for all three sites are given in the scale of 1 to 100

I have created an excel model for finding the optimum location based on factor rating method and it is scalable model for any number of data

Link to the model:

<https://assignbuster.com/the-proximity-to-customers-economics-essay/>

The site with highest score is taken as the best location in this case it is site

3. The output from the model is shown below

A major problem with simple point-rating schemes is that they do not account for the wide range of costs that may occur within each factor. To deal with this problem, it has been suggested that points possible for each factor be derived using a weighting scale based on standard deviations of costs rather than simply total cost amounts. In this way, relative costs can be considered, the method is shown below

b. Weighted factor rating method:

This method is similar to factor rating method but the difference is, here we merge quantitative and qualitative factors, factors are assigned weights based on relative importance and weights for each site using a preference matrix is calculated. The site with the highest weighted score is selected as the optimum location

c. Break Even Analysis Technique:

Breakeven point is defined as a point when the total revenue of the operation is equal to total cost. This technique can be used to determine the best location at which the total cost is less when compared to other locations

Following are the steps in determining the new location using break even analysis

Estimated volume of production

Determine variable and fixed cost for each location

Calculate total cost for the location using the below formula

$$\text{Total cost} = \text{Fixed cost} + (\text{variable cost} * \text{Sales volume})$$

Select the location with the lowest cost of for expected production volume

Example

Consider the location A, B and C producing some X product

The fixed cost for the location A, B and C is Rs30000, Rs 60000 and Rs 110000 respectively

The variable cost for producing a product X for location A, B and C is Rs 75/ unit, Rs 45/ unit and Rs 25/unit respectively

The expected sales volume of product X is 2000 units and selling price of the product is Rs X

With the above data an excel model is used to find out the best location

I have developed an excel model for calculation of location based on break even analysis

Link to the excel model:

The below figures shows the screen shot of input entered in the model

The model provides the output as shown in the below figure

Sometimes the same production location can be used to produce more of product X, In this case the estimation of the volumes to be sold in future to be identified more precisely. This is a critical drawback in this technique

Considering the volume variation and of all the location as 1000, 2000, 3000, and 4000 and entered in the model as shown below

The output for different volume in production is shown below in a graph

Output:

From the graph it is clear that up to point 1 location A is best and similarly above 2500 units location C is best, but when you consider 200 units as earlier location B best

d. Linear Programming -Transportation model

This technique is based on the assumptions of linear programming. The main objectives this technique are 1. Minimize the cost of shipping X units from one location to other (2) maximize the profit of shipping from one location to other

Following are the steps for this model:

The details of location from where the product is shipped should be listed

The details of final destination where the product to be shipped should be listed

The price of shipping one unit of product from source to destination to be entered

The limits of shipments available from source location to be specified

The limits of demand at each destination should be specified

Once all the relevant details are entered the solver function in Excel to be used to calculate the minimum total cost of transportation considering all the combinations.

Example:

The data of location from where the product is shipped is entered as F1, F2 and F3, similarly the destination of a product is entered as T1, T2 and T3

The price of shipping from F1, F2, and F3 to T1, T2 and T3 are specified in the input table as shown below

I have created an excel model for finding the minimum transportation cost for a location based on Linear programming – Transportation model

Link to model:

The limits for shipments and demand to be specified in the model and then the solver function in the excel should be used to solve the problem

The output after using solver function is shown below

The minimum possible transportation cost is calculated using the model as Rs140000 and this can also be used to compare with alternate location and choose which is better

For example

If we consider a location F4 with shipping cost to different destination T1, T2 and T3 as 300, 200, 100 respectively and considering all the other details are same then the input and output of the program will be become as shown in the below table.

e. Centroid method or Center of gravity Technique

The technique is for locating single facilities that considers the existing facilities, the distances between them, and the volumes of goods to be shipped. It is mainly used to locate intermediate or distribution warehouses. This method assumes that inbound and outbound transportation costs are equal, and it does not include special shipping costs for less than full loads.

Following are the steps for determining the location using this technique:

Place the existing location on a coordinate grid, it can have arbitrary margin and scale

The coordinates should maintain a relative distance

Calculate the centroid or center of gravity using the formula

Formula a: $C_x = \frac{\text{Sum of } (X_i * V_i)}{\text{Sum of } V_i}$

Formula b: $C_y = \frac{\text{Sum of } (Y_i * V_i)}{\text{Sum of } V_i}$

C_x - X coordinate of centroid

C_y - Y coordinate of Centroid

X_i - X coordinate of ' i ' location

Y_i - Y coordinate of ' i ' location

V_i - Volume of product moved to or from ' i ' location

Example:

Consider four location of A, B, C and D and their location co ordinate is (200, 200), (100, 500), (250, 600) and (500, 300) respectively

The shipment moved from location A, B, C and D are 75, 105, 135 and 60 respectively and now it is required to select a new location from which the goods can be moved in an optimum cost

The formula a and formula b is used for the calculation

I have created an excel model for finding the optimum new location using centroid technique

Link to the model:

The inputs are entered in the model and it is shown below

The output is calculated and the centroid location is displayed as shown below

Output

Centriod Location

X

238

Y

444

Graphical output also provided for clear understanding:

Conclusion:

Facility location decisions are a key element in any firm's overall strategic plan. Dramatic changes in the global geopolitical environment, coupled with rapid advances in technology, have placed a premium on making location decisions in a matter of weeks rather than months, as has been the case in the recent past. As a final comment, much of the location "action" is in deciding where to locate support functions rather than factories or retail outlets. In these situations the need for special capabilities of the workforce is often far more important than other cost factors. For example, IBM Business Consulting Services stated that a dominant factor in deciding where to locate the software application group of its client, a U. S. investment bank, was the availability of a large pool of multilingual workers.