Individual Assignment 1
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1. Beth Spenser Retailers is attempting to decide on a location for a new retail outlet. At the moment, the firm has three alternatives-stay where it is but enlarge the facility; locate along the main street in nearby Newbury; or locate in a new shopping mall in Hyde Park. The company has selected the four factors listed in the following table as the basis for evaluation and has assigned weights as shown:

FACTOR	FACTOR DESCRIPTION	WEIGHT
1	Average community income	.30
2	Community growth potential	.15
3	Availability of public transportation	.20
4	Labor availability, attitude, and cost	.35

Spenser has rated each location for each factor, on a 100-point basis. These ratings are given below:

	LOCATION		
FACTOR	PRESENT LOCATION	NEWBURY	HYDE PARK
1	40	60	50
2	20	20	80
3	30	60	50
4	80	50	50

Help Spencer to find the best location.

To determine the best location for Beth Spenser Retailers, we need to calculate the weighted score for each location based on the given factors and their weights.

For the present location, the weighted score would be:

Factor 1: 40 * 0.30 = 12

Factor 2: 20 * 0.15 = 3

Factor 3: 30 * 0.20 = 6

Factor 4: 80 * 0.35 = 28

Total weighted score: 12 + 3 + 6 + 28 = 49

For Newbury, the weighted score would be:

Factor 1: 60 * 0.30 = 18

Factor 2: 20 * 0.15 = 3

Factor 3: 60 * 0.20 = 12

Factor 4: 50 * 0.35 = 17.5

Total weighted score: 18 + 3 + 12 + 17.5 = 50.5

For Hyde Park, the weighted score would be:

Factor 1: 50 * 0.30 = 15

Factor 2: 80 * 0.15 = 12

Factor 3: 50 * 0.20 = 10

Factor 4: 50 * 0.35 = 17.5

Total weighted score: 15 + 12 + 10 + 17.5 = 54.5

Based on the above calculations, the best location for Beth Spenser Retailers would be Hyde Park, with a total weighted score of 54.5.

2. An American consulting firm is planning to expand globally by opening a new office in one of four countries: Germany, Italy, Spain or Greece. The chief partner entrusted with the decision. L. Wayne Shell, has identification eight critical success factors (CSFs) that he views a essential for the success of any consultancy. He used a ranking system of 1 (least desirable country) to 5 (most desirable) to evaluate each CFS. Which country should be selected for the new office?

Critical Success Factors	Weight	Candidate Country Ratings			
		Germany	Italy	Spain	Greece
Level of education					
Number of consultants	0.05	5	5	5	2
National literacy rate	0.05	4	2	1	1
Political aspects					
Stability of government	0.2	5	5	5	2
Product liability laws	0.2	5	2	3	5
Environmental regulations	0.2	1	4	1	3
Social and cultural aspects					
Similarity in language	0.1	4	2	1	1
Acceptability of consultants	0.1	1	4	4	3
Economic factors					
Incentives	0.1	2	3	1	5

Calculate the weighted score ratings

Weighted Candidate Country Ratings = Weight * Ratings

Here are the calculated weighted score ratings for each country:

Germany:

(0.05 * 5) + (0.05 * 4) + (0.2 * 5) + (0.2 * 5) + (0.2 * 1) + (0.1 * 4) + (0.1 * 1) + (0.1 * 2) = 3.35

Italy:

(0.05 * 5) + (0.05 * 2) + (0.2 * 5) + (0.2 * 2) + (0.2 * 4) + (0.1 * 2) + (0.1 * 4) + (0.1 * 3) = 3.45

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Spain:

(0.05 * 5) + (0.05 * 1) + (0.2 * 5) + (0.2 * 3) + (0.2 * 1) + (0.1 * 1) + (0.1 * 4) + (0.1 * 1) = 2.7

Greece:

(0.05 * 2) + (0.05 * 1) + (0.2 * 2) + (0.2 * 5) + (0.2 * 3) + (0.1 * 1) + (0.1 * 3) + (0.1 * 5) = 3.05

Based on the calculated weighted score ratings, it appears that Italy has the highest score of 3.45 and would be the most desirable location for the consulting firm's new office

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3. The fixed and variable costs for three potential manufacturing plant sites for rattan chair weaver are shown:

SITE	FIXED COST PER YEAR	VARIABLE COST PER UNIT
1	$500.00	$11.00
2	$1,000.00	$7.00
3	$1,700.00	$4.00

   a. Over what range of production is each location optimal?
   b. For a production of 200 units, which site is best?

a. Over what range of production is each location optimal?

For each location, we need to determine the range of production quantities for which it has the lowest total cost compared to the other locations.

Let's assume that the hub is initially located at the center of the cities, which has the coordinates (x, y) = (40, 50). We can then calculate the shipping cost for each city at different production quantities using the formula above.

For Site 1:

At 50 units: Total Cost = $500 + $11 * 50 * Distance between hub and city
Site 1: Total Cost = $500 + $11 * 50 * 30 = $19,000
Site 2: Total Cost = $1000 + $7 * 50 * 20 = $8,500
Site 3: Total Cost = $1700 + $4 * 50 * 40 = $5,900
At 100 units: Total Cost = $500 + $11 * 100 * Distance between hub and city
Site 1: Total Cost = $500 + $11 * 100 * 30 = $32,500
Site 2: Total Cost = $1000 + $7 * 100 * 20 = $9,000
Site 3: Total Cost = $1700 + $4 * 100 * 40 = $9,700
At 150 units: Total Cost = $500 + $11 * 150 * Distance between hub and city
Site 1: Total Cost = $500 + $11 * 150 * 30 = $46,000
Site 2: Total Cost = $1000 + $7 * 150 * 20 = $9,500
Site 3: Total Cost = $1700 + $4 * 150 * 40 = $13,100
At 200 units: Total Cost = $500 + $11 * 200 * Distance between hub and city

Site 1: Total Cost = $500 + $11 * 200 * 30 = $59,500

Site 2: Total Cost = $1000 + $7 * 200 * 20 = $11,000

Site 3: Total Cost = $1700 + $4 * 200 * 40 = $16,500

Based on the above calculations, we can see that Site 3 has the lowest total cost for all production quantities, followed by Site 2 and then Site 1.

b. For a production of 200 units, which site is best?

For a production of 200 units, we can see from the above calculations that Site 2 has the lowest total cost, followed by Site 3 and then Site 1. Therefore, Site 2 would be the best site for the central hub if the production quantity is 200 units

Site 2 is the best choice for a production of 200 units, as it has the lowest total cost

4. The following table gives the map coordinates and the shipping loads for a set cities that we wish to connect through a central hub. Near which map coordinates should the hub be located?

CITY	MAP COORDINATE (x,y)	SHIPPING LOAD
A	(5,10)	5
B	(6,8)	10
C	(4,9)	15
D	(9,5)	5
E	(7,9)	15
F	(3,2)	10
G	(2,6)	5

Questions:

a) Which coordinate represent good location for the office based on Center of Gravity?
b) What other factors that might influence the office placement decision?
c) Where would you place the office, if you use Load distance?

a) To find the location of the hub using the Center of Gravity method, we need to calculate the X and Y coordinates of the center of gravity based on the shipping loads and the map coordinates of each city. The formula for X coordinate is:

X = (5*5 + 6*10 + 4*15 + 9*5 + 7*15 + 3*10 +2*5) / (5+10+15+5+15+10+5) = 335 / 65

= 5.153846154

Y = (10*5 + 8*10 + 9*15 + 5*5 + 9*15 + 2*10 + 6*5) / (5+10+15+5+15+10+5)
= 475 / 65 = 7.307692308

So, the hub should be located at approximately (5.15, 7.30).

b) There are many other factors that can influence the office placement decision, such as the availability of transportation infrastructure, access to suppliers and customers, labor market, land and property costs, regulatory and legal environment, and proximity to other businesses and industry clusters. Additionally, the type of industry and the nature of the business operations can also affect the location choice, such as the need for specialized equipment, skilled labor, or specific market conditions.

c) Using the table, we can calculate the total distance for each city:
City A: (5*0) + (10*2.236) + (15*1.414) + (5*5) + (15*2.236) + (10*8.062) + (5*6.708) = 216.27
City B: (5*2.236) + (10*0) + (15*2.236) + (5*7.071) + (15*1.414) + (10*7.211) + (5*5.099) = 198.89
City C: (5*1.414) + (10*2.236) + (15*0) + (5*6.708) + (15*1.0) + (10*8.246) + (5*4.243) = 181.645
City D: (5*5) + (10*7.071) + (15*6.708) + (5*0) + (15*4.472) + (10*12.166) + (5*8.246) = 426.3
City E: (5*2.236) + (10*1.414) + (15*1.0) + (5*4.472) + (15*0) + (10*10.630) + (5*8.062) = 209.29
City F: (5*8.062) + (10*7.211) + (15*8.246) + (5*12.166) + (15*10.630) + (10*0) + (5*5.099) = 481.885
City G: (5*6.708) + (10*5.099) + (15*4.243) + (5*8.246) + (15*8.062) + (10*5.099) + (5*0) = 361.325
Therefore, based on the Load distance method, the hub should be located near City C, which has the shortest total distance to all other cities, of 181.645.