The total cost lines may be graphed following the method of example (2.1)

From the graph the following may be concluded.

Use site B for volume 70000 to 100000

Use site C for volume 100000 to 150000

Use site D for volumes 150000 to 170000

2.5.2 Cost Minimization Using Transportation Linear Programming

The relevant costs should include all the costs that vary from location to location such as transportation cost, distribution cost, etc. The transportation costs are important when the same product is produced at more than one plant and distributed to more than one centre. Detailed analysis of transportation costs is made using transportation method. The decision in case of opening new operation facilities is often made using transportation method, if only distribution costs are considered. The student is advised to refer to the book "Operations Research" by the same author or by any author for the details of the transportation method. Only the application of the method is explained here through illustrated problems.

Ex. 2.3

A company having two bakeries B_1 and B_2 is supplying products to six marketing places M_1 to M_6 . The capacity does not meet the current demand. Hence, the company is intending to build a new bakery at one of the two marketing locations M_3 and M_4 . The additional capacity will satisfy the local sales of the market in which the bakery is located and the demand of nearby market. From the following data decide the best location.

Capacity truck load / day					
Bankery	Supply	Market	Demand		
B ₁	22	M ₁	16		
B ₂	18	M ₂	18		
B_3	29	M ₃	15		
B ₄	24	M ₄	20		
		M ₅	10		
		M ₆	5		

Distribution cost Rs. / truck load						
M	M ₂	M_3	M ₄	M ₅	M ₆	
14	24	30	50	44	16	
20	14	16	32	16	14	
16	11	-	18	26	45	
35	26	18	-	,20	50	

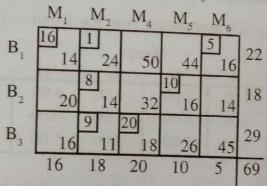
Solution:

Only one alternative is to be selected. Thus, if B₃ is choosen bakery site, the local market M₃ logically will be supplied by B₃. If B₄ is selected, M₄ will be the local market.

The supply at each bakery indicates the balance available for outlying market after the local demand has been met. Thus B_3 has a total capacity of 44 truck markets after supplying M_3 .

Thus, the following two transportation matrices are set up, one each for B_3 and B_4 alternative.

Transporation matrix for B₃ alternative



Transporation matrix for B4 alternative

	M_1	M_2	M_3	M_5	M_6	
B ₁	16 14	1 24	30	44	16	22
B ₂	20	17 14	16	1 16	5 14	18
B ₄	35	26	15 18	9 20	50	24
190	16	18	15	10	5	64

The optimal distribution is also marked in the two matrices.

Total daily cost for optimal distribution = 14x16 + 24x1 + 16x5 + 14x8 + 16x10if B₃ is selected + 11x9 + 18x20 - = 1059 rupees.

Total daily cost for optimal distribution = 14x16 + 24x1 + 16x5 + 14x17 + 16x1if B₄ is selected + 18x15 + 20x9= 1032 rupees.

 B_4 is selected as the total cost of transportation is less. Daily saving provided by $B_4 = 1059 - 1032 = 27$ rupees.

Ex. 2.4

A company having plants at A, B, C is supplying goods to three market places A₁, B₁, C₁. Because of the growing demand the company wants to establish another plant at D or E. From the cost, demand and production data given below, determine where the plant should be established.

			Demand		
my-Chira	Production	a desit De	Market	Units/month	
Plant A B	Units/month 2000 6000 5000	7.00 7.08 6.90	A_1 B_1 C_1	6000 5000 6000	
C D E	4000 4000	6.90 6.20	aoitmoquas (T		

Transportation cost Rs. / unit

			Fı	rom		
		Δ	В	C	D	Е
	٨٦	5.00	7.00	5.00	4.00	6.00
т.	A_1	6.00	4.00	7.00	3.00	4.50
То	B			3.00	5.00	5.00
	C_1	5.50	7.00	3.00	3.00	3.00

Solution:

Optimal transportation tables, considering each location D and E are given below.

	A	В	C	D	
- F	2000			4000	6000
A_1	5	7	5	4	6000
B,		5000		ELL	5000
D ₁	6	1000	5000	3	3000
C_1	5.5	7	3	5	6000
	2000	6000	5000	4000	17000

Transportation Cost = 2000x5 + 4000x4 + 5000x4 + 1000x7 + 5000x3 = 68000 rupees. Production cost at D = 4000x6.90 = 27600 rupees. Total cost = 68000 + 27600 = 95600 rupees.

	A	В	C	E	
A	2000	1000	5	3000	6000
B	6	5000	7	4.5	5000
Ci	5.5	7	5000	1000	6000
	2000	6000	5000	4000	17000

Transportation Cost = 2000x5 + 1000x7 + 3000x6 + 5000x4 + 5000x3 + 1000x5 = 75000 rupersProduction cost at E = 4000x6.2 = 24800 rupees. Total cost = 75000 + 24800 = 99800 rupees. D is the best location as it has least cost