The Unbalanced Transportation Model

The Unbalanced Transportation Model: It was previously mentioned that the sum of supply values should equal the sum of demand values. However, in some cases, these values may not be equal, resulting in an unbalanced model. To balance the model, we add the difference value to the lower value, making the :corresponding costs zero. Therefore:

1- If supply exceeds demand, add another column to the table with costs equal to zero and the difference value, then solve the model using any of the previous methods (least cost method / Northwest corner / .(Vogel method

2-If supply is less than demand, add another row to the table with costs equal to zero and the difference .value, then balance the model

3-When solving using the least cost method, the added row or column is the last one to be filled

.**Example (1):** Find the initial solution to the following problem using the least cost method

to / from	D1	D2	D3	supply
L1	2	1	3	100
L2	5	4	0	150
L3	2	3	6	50
Demand	100	120	60	300 / 280

Before starting the solution, we check if the model is balanced. Here, we observe that the total supply value is 300 and the total demand value is 280. Therefore, the model for this problem is unbalanced; supply exceeds demand. To balance supply and demand, we add another column. The difference between supply and demand is (20 = 280 - 300). We add a column with the demand value of 20 and costs equal to zero, as follows: Balancing the Transportation Model

موازنة نموذج النقل **Balancing the Transportation Model**

to / from	D1	D2	D3	D4	supply
L1	2	1	3	0	100
L2	5	4	0	0	150
L3	2	3	6	0	50
demand	100	120	60	20	300 / 300

We note that by adding the imaginary column D4 and (20) units at zero cost under model balancing, and after we balance the model, we start solving at the lowest cost .

to / from	D1	D2	D3	D4	supply
L1	2	1	3	0	100
L2	5	4	0	0	150
L3	2	3	6	0	50
demand	100	120	60	20	300 / 300

Total cost =(100*1)+(5*50)+(4*20)+(0*60)+(0*20)+(2*50)= 530

الحل تم بعد موازنة النموذج وحسب الارقام التي بالدوائر حيث تم التخصيص باقل كلفة مع ملاحظة ان العمود الوهمي الذي تمت اضافته تم التخصيص له بالنهاية .

.**Example (2)**: Find the cost for the following transportation model using Vogel's method :

to / from	D1	D2	D3	supply
L1	0	1	2	120
L2	2	3	5	100
demand	100	100	50	220 / 250

We observe that the supply is less than the demand, therefore we add a row with a value of 30 and a cost of zero, as follows:

الى / من	D1	D2	D3	العرض
L1	0	1	2	120
L2	2	3	5	100
L3	0	0	0	30
الطلب	100	100	50	250 / 250

:The initial solution to the Vogel model is as follows :

to / from	D1	D2	D3	supply
L1	0	1	2	120
L2	2	3	5	100
L3	0	0	0	30
demand	100	100	50	250 / 250

الفرق الاول	الفرق الثاني	الفرق الثالث
1	1	1
1	1	1
0	-	-

الفرق الاول 2 1 2

الفرق الثاني 2 2 3

الفرق الثالث 2 2 ~

T.C = (0*100)+(2*20)+(3*100)+(0*30)=
T.C = 300 + 40 = 340

نلاحظ انه عند تساوي اعلى الفروق فاننا نختار بشكل عشوائي كما حدث في الفرق الاول والفرق الثالث..

Example: Balance the following transportation model and then find the solution using the Northwest Corner method

to / from	D1	D2	D3	D4	aj
L1	0	4	0	2	5
L2	1	2	5	6	10
L3	5	3	7	9	15
bj	20	10	15	15	30 / 60

الفرق بين مركز العرض والطلب هو 30 وحدة $\sum a_i \neq \sum b_j$

نضيف صف وهمي بمقدار الفرق بين العرض والطلب اي (a4=30) وتكون كلفة النقل تساوي صفر

to / from	D1		D2		D3		D4		aj
L1	0	5	4		0		2		5
L2	1	10	2		5		6	10	10
L3	5	5	3	10	7		2		15
L4	0		0		0	15	0	15	30
bj	20		10		15		15		60 / 60

T.C = (0*5)+(1*10)+(5*5)+(3*10)+(0*15)+(0*15)+

T.C = 65

Notes :

1-The transportation cost from the hypothetical supply source to all centers is zero. This is because such a supply source (L) does not exist in practice. Therefore, there is no actual transportation process. What actually occurs is a problem for suppliers in meeting the needs of the demand centers. Thus, the hypothetical supply source can be charged a penalty cost for its failure to meet the requirements of the .various demand centers

In other words, there is no actual transportation process here because there are no real demand centers. This means that there are quantities available at the sources that have not been optimally utilized by the .demand centers

2-Any problem is optimally solvable without any additional procedures when the condition in the distribution table is met, i.e., oc = m+n-1 (number of occupied squares). If the number of squares in the distribution table is less than (m+n-1), then such a problem is not optimally solvable and is considered .solved. Solving in transportation problems occurs during the solution process due to two conditions

The first type of decomposition occurs during the initial basic solution process. The second type occurs during the optimal solution process when one square accommodates a quantity that was previously distributed across two or more squares. To address this, we add a very small amount of distributed capacity (supply) that does not affect the balance of the problem. This amount is then added to one or more squares so that the condition is met: the number of occupied squares equals the supply plus the demand minus one