## **CRAFT** method

Course: Operations Management

Lecturer: Marko Jakšič

As there are different variations of the CRAFT heuristic method (and it is also not that easy to find relevant information on the internet) I have decided that it is best to provide explanation for the method we have used in class. The idea behind using a heuristic method is that in large scale problems the number of possible layouts increases enormously and evaluating all possible layouts is cumbersome.

I will present here an example for 3x3 case: 3 workcenters on 3 locations.

START: start with a random layout (starting layout);

for instance:	LAYOUT 1	<u>L1</u>	L2	<u>L3</u>	
		W2	W3	W1	Cost1=10*2+20*3+15*1=95

Cost calculation always follows the same sequence of three calculations where we evaluate the costs for the three pairs of workcenters: W1-W2, W1-W3 and W2-W3. For our case the frequency of transfers is (from T matrix): T(W1-W2)=5+5=10, T(W1-W3)=12+8=20 and T(W2-W3)=8+7=15.

Then you need to check the layout for the position of the workcenter, for instance in LAYOUT1 W1 is on L3 and W2 is on L1, therefore we need to look for the distance between L3 and L1 in the distance (D) matrix: D(L3,L1)=2.

## STEP 1: select a random (chosen) workcenter;

for instance W3. In the above layout W3 is on L2, therefore we would like to place W3 also on L1 and L3. We do this by **changing the starting layout**, and interchanging the pairs of workcenters:

W3 to L1: we need to interchange W3 and W2, and we get:

W3 to L3: we need to interchange W3 and W1, and we get:

Now we have 3 layouts were W3 is placed at locations L2, L1 and L3. We determine the costs of each layout to see which layout has the minimum costs. In our example the 2<sup>nd</sup> layout has the lowest costs (85). Therefore we fix the chosen workcenter W3 to location L1.

START of the next round: start with the layout with the minimum costs; in our example this is the layout 2:

STEP 2: basically a repetition of STEP 1, but it starts with the minimum costs layout from above and by selecting a random (chosen) workcenter from the remaining workcenters (W1 or W2);

for instance W2. In the above layout W2 is on L2, therefore we would like to place W2 also on L3 by switching pair W2-W1, which leaves us with only one more layout:

We determine the costs of the layout to see whether it has lower costs that layout 2 – YES, therefore it is better to fix W2 on L3. W1 is obviously placed on the remaining location, L2.