Tutorial 7 Part 2
Analysing Business Processes

Objectives:

- **Apply the Theory of Constraints**

5. Use the theory of constraints and data in the following tables to determine how many units of each job type should be completed per week in order to maximize profits. Consider that the availability is 5,500 minutes for Resource 1 (R1), 3,000 minutes for R2 and 8,000 minutes for R3.

Job	Activity routing	Demand (units per week)	Profit Margin
A	1,4,7	80	$10
B	2,3,5,6	100	$15
C	1,3,5,6,7	120	$20

Activity	Time (min)	Resource
1	20	R1
2	12	R2
3	7	R2
4	18	R1
5	9	R3
6	29	R3
7	8	R3

- Step 1: Identify system constraints

Resource utilization calculations

Resource	Requirements (min/week)	Utilization
R1	(20 +18) × 80 + 20 × 120 = 5,440 Job A Job C	5,440/5,500 = 98.9%
R2	(12+7) × 100 + 7 × 120 = 2,740 Job B Job C	2,740/3,000 = 91.3%
R3	8 × 80 + (9+29) × 100 + (9+29+8) × 120 = 9,960 Job A Job B Job C	9,960/8,000 = **124.5%**

- R3 is the bottleneck, the constraint (Resource R3 required over 100% utilisation, so the process is constrained by Resource R3).

- Step 2: Determine how to exploit the system's constraint

  - Rule applied: Contribution per minute of the bottleneck (Profit/Labour in Resource)
    - Job A: $10/8 = $1.25
    - Job B: $15/38 = $0.39
    - Job C: $20/46 = $0.43

  »» Process A first, then C and finally B

- Step 3. Subordinate everything to the decisions in Step 2

  Max of Job A = 8,000/8 = 1,000 jobs yet only need 80 units of A so process 80 units of Job A;
  Max of Job C = (8,000 - (80 × 8))/46 = 160 jobs yet only need 120 units of C so process 120 units of Job C;
  Max of Job B = (8,000-(80 × 8 + 120 × 46)/38 = 48.4 so process 48 units of Job B.

  Total Profit of this processing plan = 80 × $10 + 120 × $20 + 48 × $15 = **$3,920**