

Project Planning & Control

Lesson 2

Factors influencing Productivity, Example for Ideal Productivity, Factored Productivity and Working Time Factor

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Professor

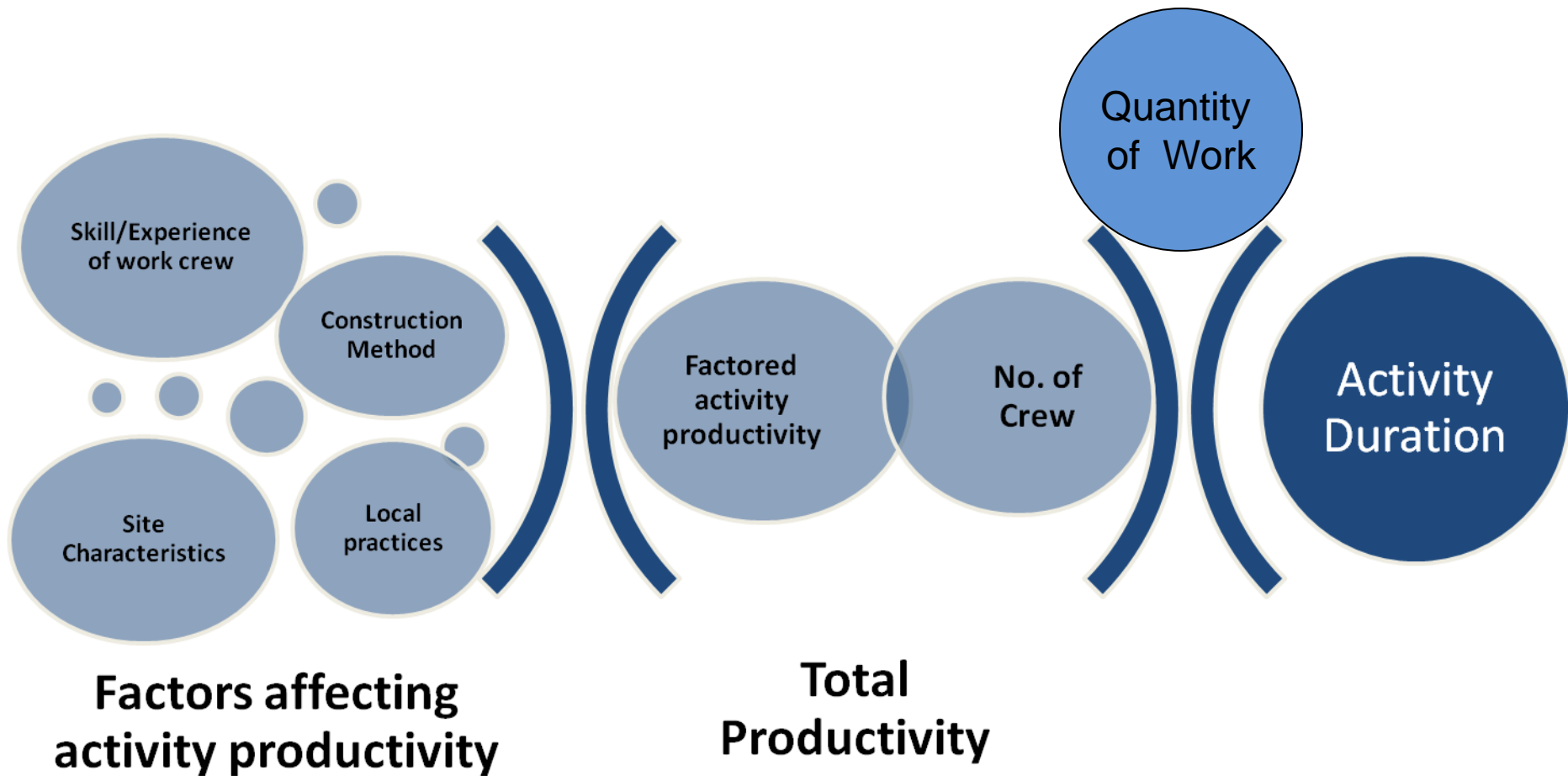
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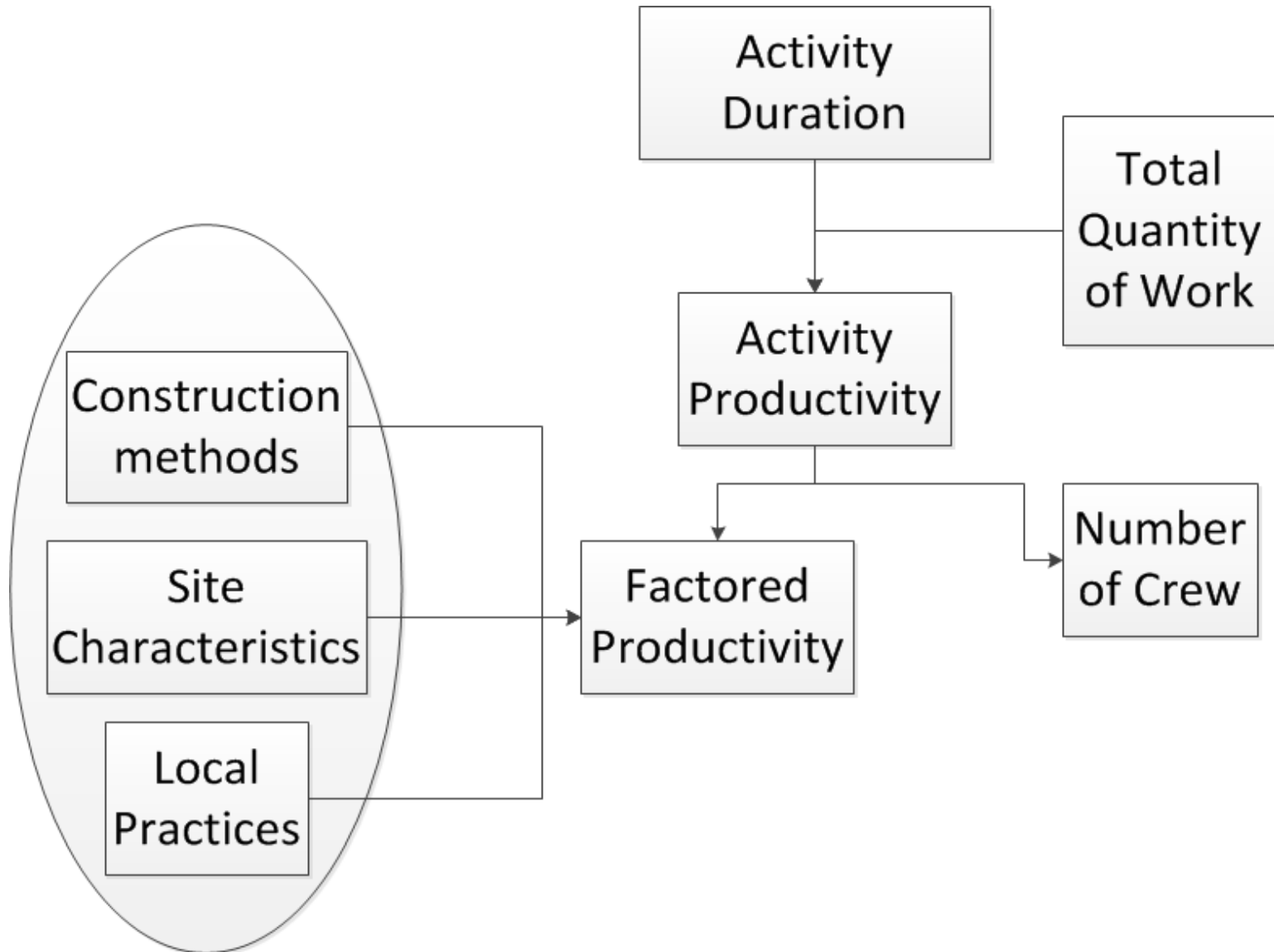


Factors Influencing Productivity



$$\text{Productivity} = \text{Production} / \text{Day} / \text{Crew (or Person)}$$

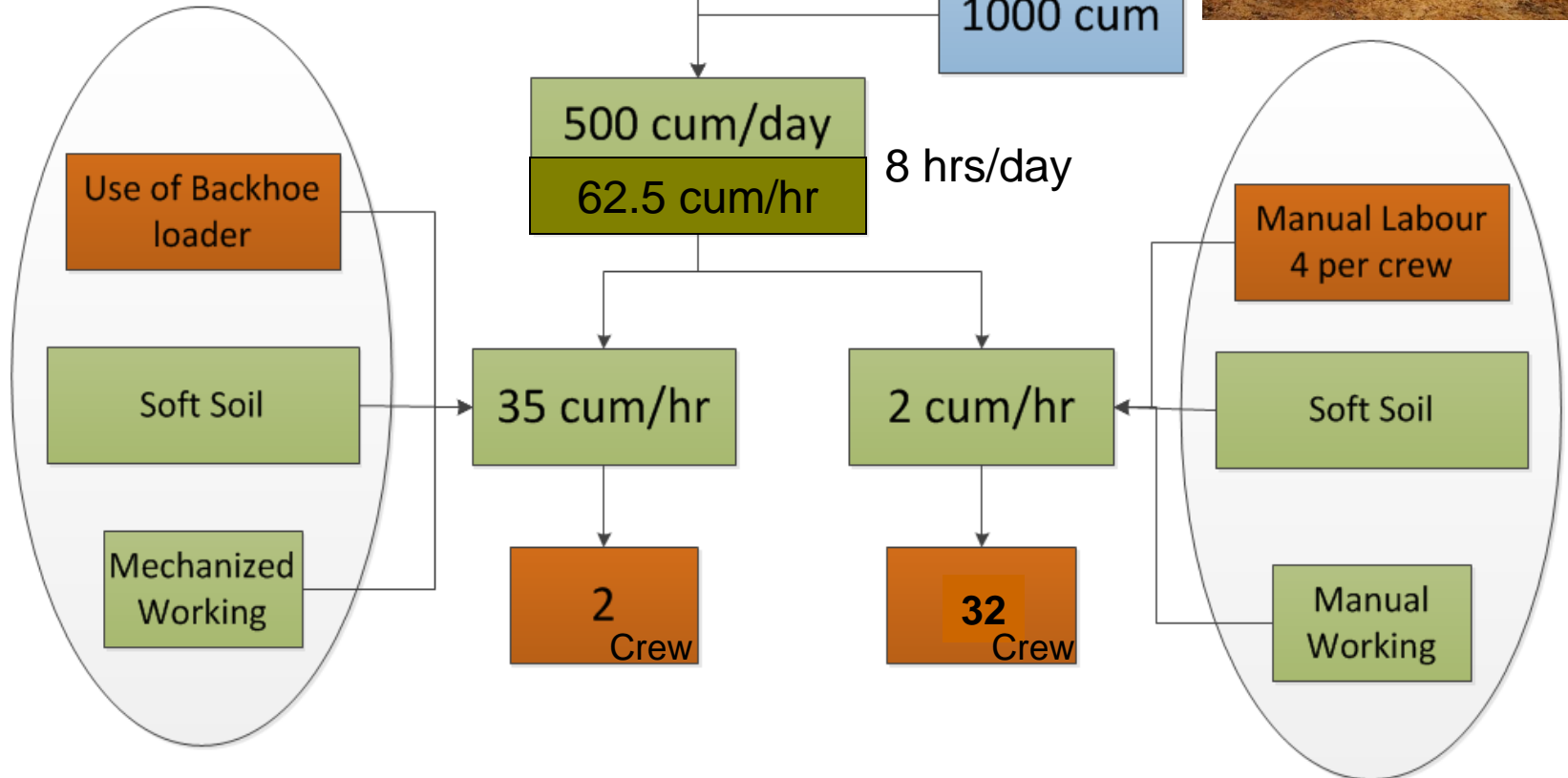
Duration Driven Estimates



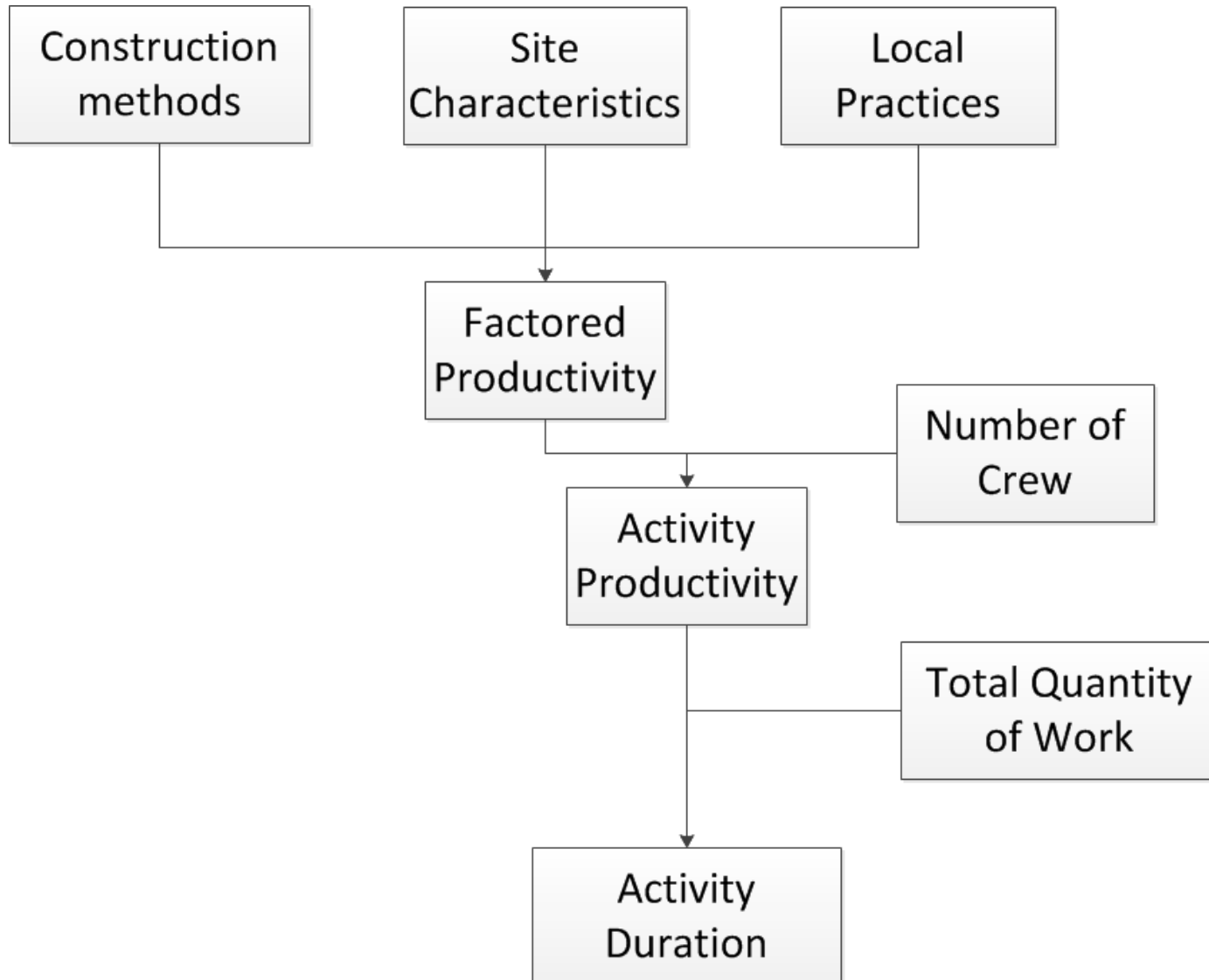
Duration Driven Estimates

- Excavation of soft soil on a site has to be completed in 2 days. The total quantity of excavation is 1000 cum.
- Based on the previous flowchart the factored productivity and crew size can be estimated.
- The flowchart shows steps to determine the crew size for both methods

Duration Driven Estimates

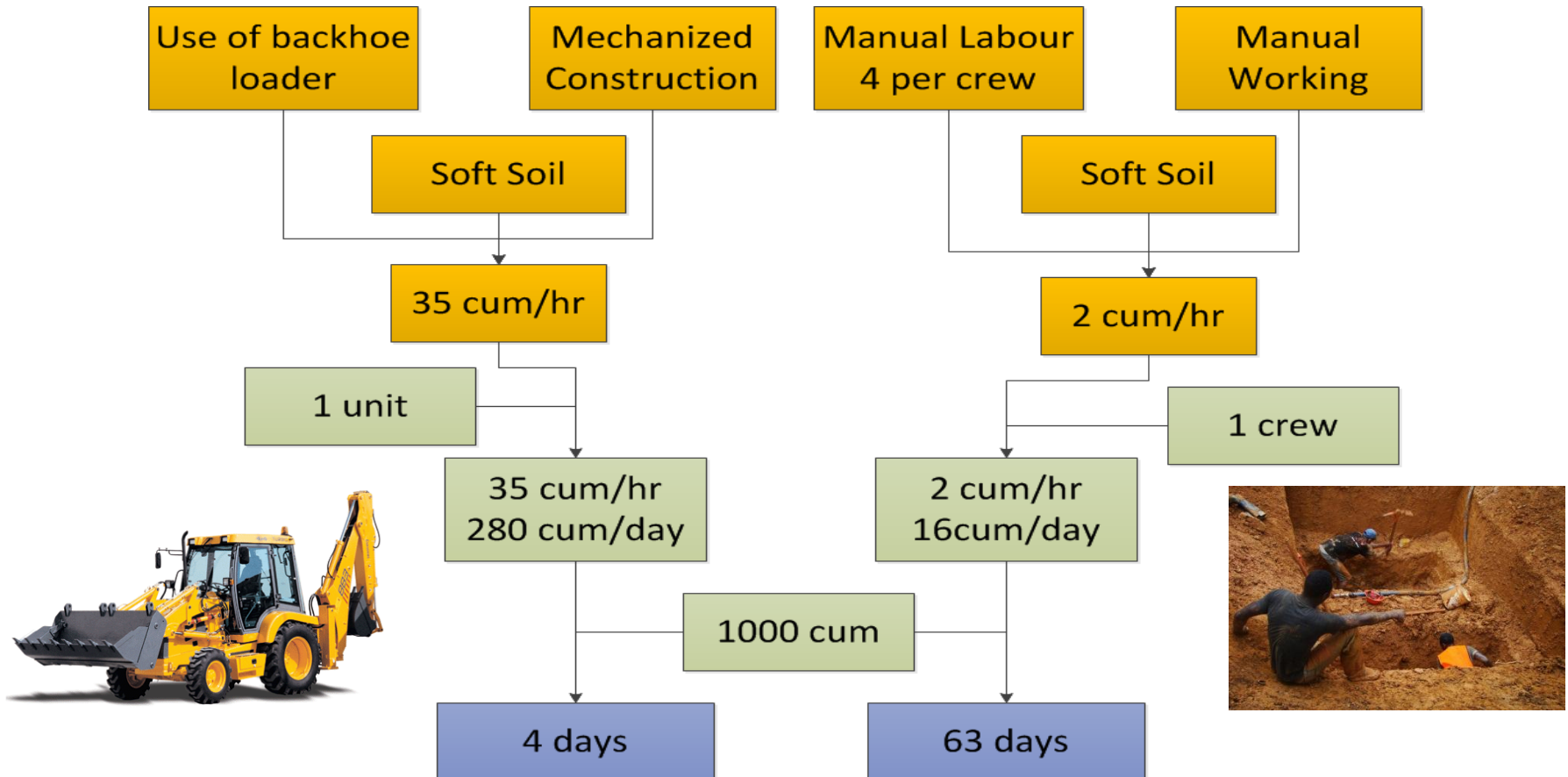


Resource Driven Estimates



Resource Driven Estimates

- Consider the same excavation example without a duration constraint but with a quantity and a resource constraint



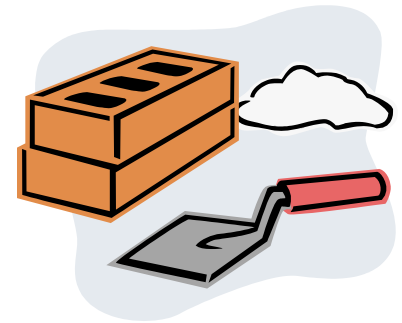
Examples

Example 1 – Ideal Productivity

- Calculate the duration required for the construction of a solid block masonry wall without finishing.



- 2 crews each of 1 mason + 1 helper
 - Total Quantity of Work to be done – 600 Sqm
 - Productivity– 20 Sqm/day/crew
 - Working Time – 10hrs/day





Ideal Productivity – Solution

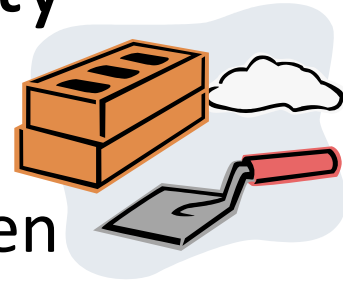
Duration = Quantity / Production

Production = Productivity * No. Crew

Production = $20 * 2 = 40$ sqm/day

Duration = $600 / 40 = \mathbf{15 \text{ days}}$

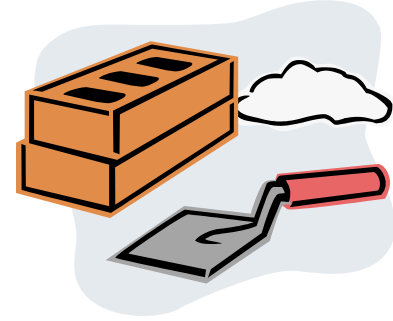
Example 2 – Factored Productivity



- Block work is now being done at a height between 8m~15m by same crew.
 - Quantity – 600 Sqm in each area
 - Productivity at ground floor– 20 Sqm/day/crew
 - For working at height we have consider the following factors that reduce the efficiency of the crew
 - Scaffolding and other equipment - 0.9
 - Movement of materials – 0.9
 - Safety precautions for working at height – 0.95
 - Working time for the crew is 10 hours a day
- Calculate the duration



Example 2 - Solution



- Factored productivity for Working at height
 $20 - [(1 - 0.9) * 20] - [(1 - 0.9) * 20] - [(1 - 0.95) * 20]$
 $= 15 \text{ Sqm/Day}$

$$\textit{Duration} = \frac{\textit{QuantityOfWork}}{\textit{FactoredProductivity} * \textit{NoOfCrew}}$$

$$\textit{Duration} = \frac{600}{15 * 2} = 20 \textit{Days}$$

Example 2a –Working Time Factor



- 10 hr workday – productive time ? 9am-7pm
- Breaks 11-11:15am 1-1:45pm 4-4:15pm etc. the effective working time is only 8.5 hours.
- Calculate the modified duration for block work considering this.



Example 2a - Solution

- Factor for working time
Actual Working hours/Ideal Working hours
 $8.5/10 = 0.85$
- Actual Duration = Ideal Duration/Working time Factor
 - For Block work on ground
 $=15/0.85 \sim 18\text{days}$
 - For Block work on scaffold
 $=20/0.85 \sim 24\text{days}$