

BUAD 311 Session 2 In-Class Practice: Process Analysis

At an ice-cream shop, the ice-cream scooper can serve 20 customers per hour and the cashier can ring up 30 customers per hour.

a) What is the capacity of the ice-cream shop in customers per hour? What is the bottleneck?

- Capacity of the scooper is 20 customers per hour
- Capacity of the cashier is 30 customers per hour
- Hence, the bottleneck (the resource with the lowest capacity) is the scooper.
- The capacity of the bottleneck is the capacity of the process -> The capacity of the ice-cream shop is 20 customers per hour

b) What is the utilization of the cashier assuming process fully utilized?

- Utilization is defined as $(\text{flow rate})/(\text{capacity})$.
- We have the capacity of the cashier from a).
- Now we need to compute the flow rate.
- Flow rate = $\text{minimum}(\text{available input, demand, process capacity})$
- Because the process is fully utilized (given in the question), we have unlimited available input and unlimited demand. Hence, Flow rate = $(\text{infinity, infinity, 20 customers per hour}) = 20 \text{ customers per hour}$
- So, Utilization = $(\text{flow rate})/(\text{capacity of the cashier}) = (20 \text{ customers per hour})/(30 \text{ customers per hour}) = 66.7\%$

c) If one more ice-cream scooper is hired, what is the capacity of the ice-cream shop and what is the bottleneck?

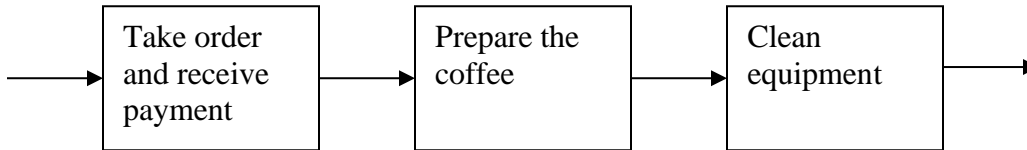
- Capacity of the scooper(s) changes to 40 customers per hour
- The bottleneck (the resource with the lowest capacity) is now the cashier.
- The capacity of the bottleneck is the capacity of the process -> The capacity of the ice-cream shop is now 30 customers per hour

d) Disregarding the above, if one more cashier is hired, what is the capacity of the ice-cream shop and what is the bottleneck?

- Capacity of the cashier(s) changes to 60 customers per hour
- The bottleneck (the resource with the lowest capacity) is still the scooper and the capacity of the ice-cream shop is 20 customers per hour.

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Eastern Coffee follows the flow chart below to serve its customers. Note that some triangles may be omitted intentionally. It takes a worker two minutes to take order and receive payment, two minutes to prepare coffee, and three minutes to clean equipment.



Eastern Coffee has two workers: worker A takes order and prepares coffee, while worker B handles the cleaning.

- a) On average, 10 customers per hour show up and order coffee. What is the utilization rate of worker A? And what is the utilization rate of worker B?

Capacity of worker A: $60/(2+2) = 15$ customers/hour

Capacity of worker B: $60/3 = 20$ customers/hour

Utilization of A: $10/15 = 0.666$ or 66.6...%

Utilization of B: $10/20 = 0.5$ or 50%

- b) How many customers can Eastern Coffee serve per hour?

From the above, Capacity of Eastern Coffee is 15 customers/hour, as identified by the bottleneck (worker A).

Western Coffee follows the same flow chart above, and each activity takes the same amount of time as Eastern. Western Coffee also has two workers: worker C only takes order and payment, while worker D handles the coffee preparation and cleaning.

- c) How many customers can Western Coffee serve per hour?

Capacity of worker C: $60/2 = 30$ customers/hour

Capacity of worker D: $60/(2+3) = 12$ customers/hour

Capacity of Western Coffee is 12 customers/hour

- d) The manager of Western Coffee notices that cleaning is not a critical activity in the sense that it can be delayed and be finished when there are fewer customers. Therefore, during the peak hour when many customers come in, workers can focus on serving customers and temporarily ignore the cleaning activity. Then how many customers can Western Coffee serve during the peak hour?

Capacity of worker D during the peak hour: $60/2 = 30$ customers/hour

Capacity of Western Coffee is 30 customers/hour