

EXERCISE QUESTIONS FOR EVALUATING CAPACITY (and Product mix)

Question 1

A law firm specializes in the issuance of insurance policies covering large commercial real estate projects. The projects fall into two categories: shopping centers, and medical complexes. The typical work involved in each transaction is quite predictable and repetitive. The time requirements (unit loads) for preparing a standard contract of each type are given in table below. Also listed are the number of professionals of each type and the number of available hours per professional per day (the rest of time is taken by other office activities):

	Unit Load - Shopping (hours per contract)	Unit Load - Medical (hours per contract)	No. of Professionals	Hours available (hours per professional per day)
Paralegal	4	6	4	6
Tax lawyer	1	3	3	8
Senior partner	1	1	2	4

For the month of Nov. 2010, the firm has generated 150 orders, 75 of each type. Assume one month equals 20 days.

- What is the effective capacity of the process (contracts per day)?
- Can the company process all 150 cases in November?
- If the firm wishes to process all the 150 cases available in November, how many professionals of each type are needed?

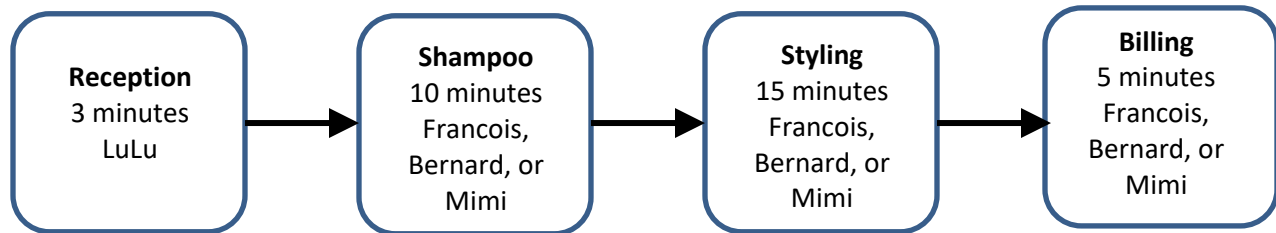
Question 2

Reconsider the law firm of Question 1. Assume the prevailing revenues per shopping and medical projects are \$4000 and \$5000 per project, respectively, and that out of pocket expenses associated with each project are negligible. The (fixed) cost of operating the office is \$500,000 per month.

- a) What type of project is the most profitable?
- b) At the current project mix (50%-50%), how much contribution margin is generated (\$ per day)?
- c) At the current product mix, what is the profit at capacity?
- d) At the current product mix, what is the value of hiring an extra Paralegal?

Question 3

Three hairstylists, Francois, Bernard, and Mimi, run Fast Service Hair Salon for busy professionals in the Gold Coast area of downtown Chicago (See Figure below).



They stay open from 6:45 a.m. to 9:00 p.m. in order to accommodate as many people's work schedules as possible. They perform only shampooing and hairstyling activities. On average, it takes 10 minutes to shampoo, 15 minutes to style the hair, and 5 minutes to bill the customer. When a customer arrives, he or she first checks in with the receptionist (Bernard's younger sister LuLu). This takes only 3 minutes. One of the three stylists then takes charge of the customer and performs all three activities – shampooing, styling, and billing- consecutively.

- a) What is the number of customers that can be serviced per hour in this hair salon?
- b) A customer of Fast Service Hair Salon, an operations specialist, has suggested that the billing operation be transferred to LuLu. What would be the impact on the theoretical capacity?

Question 4

A company makes two products A and B, using a single resource pool. The resource is available for 900 minutes per day. The contribution margins for A and B are \$20 and \$35 per unit respectively. The unit loads are 10 and 20 minutes per unit.

- a) Which product is more profitable?
- b) The company wishes to produce a mix of 60% As and 40% Bs. What is the effective capacity (units per day)?
- c) At the indicated product mix, what is the financial capacity (profit per day)?

Question 5

Consider a process consisting of three resources:

Resource	Processing Time (min/unit)	Number of Workers
1	10	2
2	6	1
3	16	3

- a) Where is the bottleneck?
- b) What is the process capacity?
- c) What is the flow rate if demand is 8 units per hour?
- d) What is the utilization of each resource if demand is eight units per hour?

Question 6

Consider a process consisting of five resources that are operated 8 hours per day. The process works on three different products, **A**, **B** and **C**.

Resource	Number of Workers	Processing Time for A (min/unit)	Processing Time for B (min/unit)	Processing Time for C (min/unit)
1	2	5	5	5
2	2	3	4	5
3	1	15	0	0
4	1	0	3	3
5	2	6	6	6

Demand for the three different products is as follows: product A, 40 units per day; product B, 50 units per day; and product C, 60 units per day.

a) Where is the bottleneck?

b) What is the flow rate for each flow unit assuming that demand must be served in the mix described above (i.e., for every four units of A, there are units of B and six units of C)?