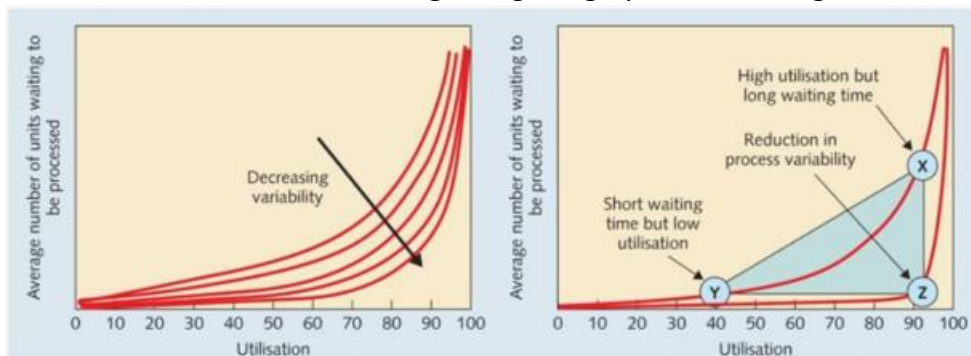


Queue

1. In a store there are 5 people waiting in line for the payment. There are 2 cash counters and the service of each cashier is 2 people every 10 minutes. Each cashier has its own queue. What is the queue configuration?
 - a. $2M/M/2$
 - b. $2M/M/1$
 - c. $M/M/5$
 - d. $M/M/2$
2. Chose the one correct answer regarding the graph with X being the AS-IS situation



- a. To move from X to Y, we want to reduce the average number of units in line, we should reduce the utilization rate by reducing the number of resources
 - b. **Process variability results in simultaneous waiting and resources underutilization**
 - c. In order to move from X to Z, we should reduce system variability by introducing more resources
 - d. All the answers are correct
3. In a bar, the barman is able to serve 2 people every 8 minutes. The arrival rate of clients has been estimated to be around 10 people every hour. Estimated the saturation of the barman.
 - a. 0.5
 - b. 0.2
 - c. 1.5
 - d. **0.67**
 4. In a grocery, there are 5 people waiting in line for the payment. There are 2 cash counters, and the service rate of each cashier is 2 people every 10 minutes. The clients are served by the 2 cashiers following a FIFO approach in one single line. What is the queue configuration?
 - a. $2 M/M/2$
 - b. $2 M/M/1$
 - c. $M/M/5$
 - d. **$M/M/2$**
 5. Choose only one correct answer regarding the customer behaviour in a queuing system modelling
 - a. Rejecting is when a customer already in the queue gives up the service and goes away without being served
 - b. Balking is when a customer already in queue gives up the service and goes away without being served

- c. Reneging is when a customer already in queue gives up the service and goes away without being served
- d. Reneging is when a customer decides not to enter a queue because it is already too long

OS

1. With Pre-Shop-Pool and workload planning, the company :
 - a. Reduces WIP and Shop-Floor time
 - b. Controls the production and reduces necessity operators
 - c. Reduces setups
 - d. Immediately releases production orders to shorten lead-time
2. What are the PROs for the leading strategy?
 - a. Lower impact of unforeseen events and underestimating demand, spare parts capacity, better deliver reliability
 - b. Lower production costs, lower impact from overestimating demand, high plant utilization
 - c. Lower impact of unforeseen events, high plant utilization, spare parts capacity, better delivery reliability
 - d. Outbound cash flow, higher impact of overestimating demand, higher production costs
3. In the service industry, the level of satisfaction of a customer has been defined
 - a. By the experience
 - b. As the difference between the expectation and the service price
 - c. As the difference between perception and expectation
 - d. By the experience of the outcome
4. What are the service product characteristics?
 - a. Simultaneity, customer participation, homogeneity, perishability
 - b. Perishability, intangibility, time consuming, homogeneity, customer participation
 - c. Intangibility, simultaneity, heterogeneity, customer involvement in the service process, perishability
 - d. Simultaneity, heterogeneity, invisibility, customer involvement in the service process, perishability
5. How would you compute the variability?
 - a. The difference between the average value and the actual value
 - b. The difference between the average value and the forecasted value
 - c. The difference between the average value and the forecasted value (sì, era doppia)
 - d. The difference between the actual value and the forecasted value
6. Investing in cross-trained employees supports company to
 - a. Reduce demand variability
 - b. Make capacity more flexible
 - c. Increase time-buffer for customers
 - d. Increase overall capacity
7. Which characteristic belongs to a professional service shop compared to professional service?
 - a. More attention to quality
 - b. Request of knowledge sharing
 - c. Less attention to cost
 - d. More product innovation
8. You are a manager of a restaurant; if your service process (output) is affected by variability, which lever do you invest in?

- a. Reservation system
 - b. Promotion
 - c. Standardization of activities
 - d. Increase customer participation in the process
9. Which characteristic belongs to a performance that is classified as Order Qualifier?
- a. Company's quality performance is very good
 - b. If company's performance improves, the company gains more orders
 - c. If company's performance gets worse, the company loses orders
 - d. The performance defines the competitive advantage of the company

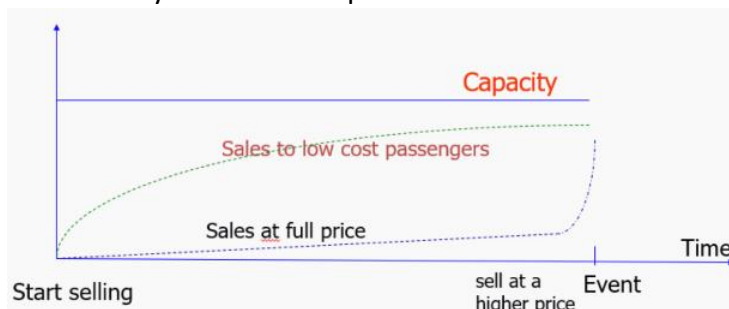
Lean

1. The assembly stage of Ryccar Spa company process 5 variants of bikes and works 1350 min/day. Average demand is equal to 50 bikes/day. Assembly stage is fully dedicated, and its availability is 75%. Cycle time to assemble bikes is 18 min/bike. Assembly stage requires a setup every time the variant changes. Changeover time is equal to 35min/setup. Which of the following EPE for the assembly stage is the correct one?
 - a. 1.16 days
 - b. 0.38 days
 - c. 1.45 days
 - d. 0.79 days
2. Which is the most probable decision you can find if a company decides to drive digital transformation through lean principles?
 - a. Automations in order to exploit new technologies for increasing capacity
 - b. HMI technologies in order to increase flexibility of operators
 - c. RFID technologies in order to track real time product status
3. Consider a manufacturing company producing machine tools and define which activity is value adding:
 - a. Test a product before sending it to the customer
 - b. Inserting a ball shift on its shaft
 - c. Bring electric motors from the warehouse to the place where machine tool is assembled
 - d. Plan internal and external operators' activities for the next week
4. During SMED
 - a. Setup activities are automatized
 - b. Internal activities are moved to the begin or to the end of setup procedure
 - c. External activities are moved to the begin or to the end of setup procedure
 - d. Products are batched in order to reduce setups
5. Shotter Spa produces pencils and works with 2 shifts ($T_a=900$ min/day). The average demand is 300 pencil/day. There are 2 production stages, both fully dedicated and with availability of 100%: P1 (CT=30 sec/pencil; CO=5 min/setup) and P2 (CT= 25sec/pencil; CO=0 min/setup). Which is the Minimum Batch Size of the company?
 - a. MBS= 2 pencil/batch
 - b. MBS= 150 pencil/batch
 - c. MBS= unitary batch
 - d. MBS= 230 pencil/batch
6. Considering an R&D department led by Lean Innovation concepts, which is the most probable context you can find?
 - a. Function Pushing for perfect learning cycle, launching product on the market only when all the features are completed
 - b. Function Pushing for fast learning cycle through many small iterative projects
 - c. Function Pushing for fast learning cycle with very big teams in order to have more resources on the same projects
 - d. Teams working at the same time on more projects in parallel
7. Which is the longest time in an operations system?
 - a. Throughput time

- b. Value adding time
 - c. Cycle time
 - d. Not-value adding time
8. Bendys Spa is a MTO company. Production process is made by 4 stages with the following EPE values: $EPE(S1)=3.15$ days; $EPE(S2)=0.16$ days; $EPE(S3)=0$; $EPE(S4)=1.14$ days. Which is the time period necessary to Bendys Spa to produce the whole mix and satisfy required by the customers?
- a. 3.15 days
 - b. 1.14 days
 - c. It depends on the amount of stocks and raw materials
 - d. 1.1125 days
9. The impact of Heijunka box is of
- a. Creating continuous flows
 - b. Reducing bullwhip effect
 - c. Increase safety stocks
 - d. Reducing setups
10. DECAF conditions analysis supports managers in
- a. Increase availability of a cell
 - b. Defining optimal level of stocks
 - c. Improving planning of production
 - d. Understanding gap for creating continuous flow

Yield

1. Chose the only correct answer
 - a. Cost of underestimation includes the lost revenue associated with reserving too few seats as discounted fare (underestimated demand)
 - b. Cost of underestimation includes the cost of reserving too many seats at full fare (overestimated demand). As if the empty full-fare seat could have been sold at the discounted price
 - c. Cost of underestimation includes the lost revenue associated with reserving too few seats as full fare (underestimated demand)
2. How would you define the Heuristic EMSR method?
 - a. An iterative method used to set the right overbooking when there is no-show phenomenon
 - b. An iterative method used to maximise the profit by appropriately allocating the available capacity whenever there are more than 2 classes of customers
 - c. An iterative method used to maximise the profit by appropriately allocating the available capacity whenever there are less than 3 classes of customers
 - d. An iterative method used to set the right overbooking strategy by appropriately allocating the available capacity whenever there are more than 2 classes of customers
3. Which of these sets of characteristics represent the ideals for yield management?
 - a. Variable capacity, perishable inventory, low capacity-change costs, and product booked in advance
 - b. Fixed capacity, perishable inventories, low capacity-change cost, and ability to segment markets
 - c. Perishable inventory, high capacity-change costs, product sold after its use and fixed demand
 - d. Fixed capacity, perishable inventory, high capacity-change costs, ability to segment market, fluctuating demand and products booked or sold in advance
4. Choose only one correct option



- a. In order to maximise my revenues, it is more convenient to sell all tickets to low-cost passengers as I am sure they will buy them all
 - b. Having fixed capacity of event's seats, we should start selling full price tickets to ensure profit maximisation and cover all the seats available
 - c. Protection level of full price customers is necessary to avoid cannibalization from discounted price tickets
 - d. Protection level of discounted price tickets is necessary to avoid cannibalization from full price tickets
5. Which of the following system characteristics make YM not useful?

- a. Possibility to buy/book in advance the product/service
- b. Products are perishable
- c. System's variable capacity
- d. There are different types of customers (segments)

Cases

1. In the **HQ case**, which lever should you implement in order to improve flexibility performance?
 - a. Split production capacity in higher number of machines
 - b. Increase capacity saturation
 - c. Launch production of big batches in order to reduce setups
 - d. Increase automation grade in order to produce faster
2. **Shouldice Hospital** plays mainly on 2 levers to provide customers with such a high well-recognized value. Which are them?
 - a. High specialization (only one surgery) and high competences of its own employees
 - b. High specialization and low price
 - c. High competences of its own employees that enable Shouldice to deliver above-average quality
 - d. Low price and competences of its own employees
3. In the **HQ case**, which are the most significant performances to compete in the new market?
 - a. Time (speed), flexibility (product and plan) and quality of design
 - b. Time (speed), price and flexibility (variety)
 - c. Quality (conformity) and time (delivery reliability)
 - d. Price and quality of design
4. **Shouldice Case** represents a “best practice” of alignment between market and operations. How is its concept built?
 - a. The concept of Shouldice hospital is based on both outcome and experience provided to the patients
 - b. Shouldice hospital built its concept on the outcome, namely the high success rate in the hernia surgery
 - c. Shouldice hospital built its concept on the short and predictable time required to patients to recover from hernia surgery
 - d. The concept of Shouldice hospital is based on the low price for hernia surgery compared to competitors
5. In the **HQ case**, which of the following is not a consistent “structural choice” according to the new market?
 - a. Small number of big production machines in order to ensure machine saturation
 - b. Increasing the production capacity in order to absorb demand variability
 - c. Mono-impression moulding in order to ensure lower setup times
 - d. Low automation grade