OIDD Cheat Sheet

Cheatography

by vicy12341 via cheatography.com/144393/cs/30992/

| Lecture 2 | |
|--|---|
| Flow Rate | Min between demand and capacity |
| Utilization = R/Capacity | fraction of time spent working |
| Cycle Time = 1/ Flow Rate | Time between when units exit process |
| Flow Time = I/R | Time unit spends in process |
| Cost of Direct Labor | =(wages per unit of time x #of workers) / Flow Rate |
| Labor Content | sum of processing times involving labor (don't multiply by #of workers) |
| Labor Utilization | = R / Labor Capacity |
| Labor Capacity | = N (# of workers) / Labor content |
| Takt Time =1/ Demand Rate | Time between when flow units are demanded |
| Target Manpower = Labor Content/ Takt Time | = Labor Content/ Takt Time |
| Goal of Line Balancing | Find min cycle time |

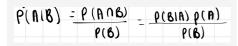
Process Flows (Lecture 1)

| Little's Law: I = R | I= Inventory, R= Flow | |
|---|-------------------------|--|
| хΤ | Rate, T= Flow Time | |
| Days of Supply = | The "T" in Little's Law | |
| I/R = 1/Turns | (add def) | |
| Inventory Turns = 1/T = R/I = COGS/ I | | |
| COGS = R, the flow rate | | |
| Gross Margin % = (Price - Cost) / Price | | |

Decision trees

| Maximin Decision | Find the minimums of each branch, then choose the max of the mins |
|---|--|
| Maximax Decision | Find the max of each branch, then choose the max of the maxes |
| Expected value of Perfect info | = (expected value of decision w/ perfect info) - (expected value of decision w/o perfect info) |

Baye's Rule



Queues

Queues (cont)

Inventory in service = p/a CVa= Standard deviation inter arrival time / avg inter arrival time CVp= Standard deviation processing time/ avg processing time Time in queue increases dramatically as utilization approaches 100% Yield and Capacity of Process Yield = Flow Rate goof output/ Flow rate bad output

Yield of Process = Product of resource yields

| Implied Utilization | Can be over 100% , | |
|---|------------------------|--|
| = Demand/ | bottleneck has highest | |
| Capacity | IU | |
| Capacity = 1/Processing Time | | |
| Processing Time = 1/Capacity | | |
| Demand (in min of work) = Processing time | | |
| x Demand | | |
| | | |

Required input = Desired output/ Process yield

Required resource capacity = Resource's demand with required input

Required resource capacity = Resource's demand with required input

Finding capacity Find capacity of each of process step and find the bottleneck

Solving Questions

Solving Questions (cont)

Length of queue at time T = T x (Demand -Capacity)

Time to serve Qth person in queue = Q/Capacity

Time to serve customer arriving at time T = T x (Demand/Capacity-1)

Avg time to serve customers in the queue = 1/2 x T x (Demand/Capacity -1)

Variables a= inter arrival time, m= # of to know workers/kiosks, p = avg processing time

Demand = 1/a

Capacity= m x (1/p)

Utilization = P / (a x m)

m = P /(a x utilization)

Time spent in system = Time in queue + Time in processing

Inventory = Inventory in queue + Inventory in service

Inventory in queue = Time in queue/ a

| What the question is asking | Approach to take |
|--|--|
| Inventory costs are what percent of purchasing costs? | Find Flow Time. Then multiply annual inventory cost percentage by flow time in years and by individual unit cost |
| Cost to hold inventory for a year What is the avg time | Cost of individual unit x annual holding cost percentage Find flow time |

| Total time to process 20 customers | Time to process 1st customer (sum of processing times) + time to process other customers (19 x Cycle |
|--|--|
| Total ordering | Time) (K x R) / Q |
| Total holding costs | 1/2 x Qh |
| How many individual units should they produce in each batch | Use desired capacity to find full batch size. Then multiply batch size by ratio of individual demand/ca- pacity over total demand/capacity |
| If company ordered a specific number of cases at a time, what would be their holding and ordering costs | Find C(Q) |
| If company ordered a specific number of cases, what would be holding and ordering cost per case | Find C(Q)/ R |
| Quantity of cases per order | Find EOQ |
| How long will you wait if you are nth in line | Find the time to serve the number of people in front of you. |

Avg Inventory

 $\frac{1}{2} \times Batch size \times (1 - Flow)$

Setup Times and Batching

Capacity = Number of units produced/ Time to Produce units

Utilization (with a setup time) = Flow rate x Processing Time

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 $Capacity = {Batch size \over Setup time + Batch size imes Processing time}$

| EOQ and (| Quantity Discounts |
|--|---|
| Inventory Variables | Q= quantity in each order, R=Flow Rate, h = inventory holding cost per unit time, K= fixed vost per order |
| Time betwe | een shipments = Q/R |
| Avg invente | ory = Q/2 |
| Number of orders placed per unit of time = R/Q | |
| Capacity (in min of work/hr) = #of workers x 60 | |
| Quantity minimizing ordering and holding costs | |
| | $Q^* = \sqrt{\frac{2 \times K \times R}{\hbar}}$ |
| Batch Size | |
| | Butch size = Capacity * Setup time I - Capacity * Processing time |
| Ordering plus inventory holding cost per unit time | |
| | $C(\mathbf{Q}) = \frac{\mathbf{K} \times \mathbf{R}}{\mathbf{Q}} + \frac{1}{2}h \times Q$ |
| Time in Qu | EUE Time in queue $-\binom{p}{m}_{n} \left(\frac{(lilitation)^{2m(n)}}{1-lilitation} \right)_{n} \left(\frac{Cr_{i}^{2} + cCr_{j}^{2}}{2} \right)$ |

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