

OBJECTIVES

- Process Analysis
- Process Flowcharting
- Types of Processes
- Process Performance Metrics

- Process: Is any part of an organization that takes inputs and transforms them into outputs
- Cycle Time: Is the average successive time between completions of successive units
- Utilization: Is the ratio of the time that a resource is actually activated relative to the time that it is available for use

Process Flowcharting *Defined*

- Process flowcharting is the use of a diagram to present the major elements of a process
- The basic elements can include tasks or operations, flows of materials or customers, decision points, and storage areas or queues
- It is an ideal methodology by which to begin analyzing a process

Purpose and Examples

Tasks or operations

Examples: Giving an admission ticket to a customer, installing a engine in a car, etc.

Decision Points

Examples: How much change should be given to a customer, which wrench should be used, etc.

Purpose and Examples

Storage areas or queues

Examples: Sheds, lines of people waiting for a service, etc.

Flows of materials or customers Examples: Customers moving to a seat, mechanic getting a tool, etc.



Single-stage Process



Multi-stage Process



Types of Processes (Continued)

A buffer refers to a storage area between stages where the output of a stage is placed prior to being used in a downstream stage

Multi-stage Process with Buffer

Blocking

- Occurs when the activities in a stage must stop because there is no place to deposit the item just completed
- If there is no room for an employee to place a unit of work down, the employee will hold on to it not able to continue working on the next unit

• Starving

- Occurs when the activities in a stage must stop because there is no work
- If an employee is waiting at a work station and no work is coming to the employee to process, the employee will remain idle until the next unit of work comes

Other Process Terminology (Continued)

Bottleneck

- Occurs when the limited capacity of a process causes work to pile up or become unevenly distributed in the flow of a process
- If an employee works too slow in a multi-stage process, work will begin to pile up in front of that employee. In this is case the employee represents the limited capacity causing the bottleneck.

• Pacing

 Refers to the fixed timing of the movement of items through the process

11

Other Types of Processes

- Make-to-order
 - Only activated in response to an actual order
 - Both work-in-process and finished goods inventory kept to a minimum
- Make-to-stock
 - Process activated to meet expected or forecast demand
 - Customer orders are served from target stocking level

Operation time = Setup time + Run time setup time= preparation time run time = time to produce a batch of output (unit)

Throughput time or Flow time = Average time for a unit to move through the system

Value-added time= productive work done on a unit

Velocity = <u>Throughput time</u> Value-added time **Process Performance Metrics (Continued)**

Cycle time = Average time or <u>60mins</u> between completion of units Unit produced - Elapse time between starting and completing a job

Throughput rate = 1

Cycle time

 or Capacity rate: max # a process expected to produce over period of time

Efficiency = <u>Actual output</u> Standard Output efficiency: 36/30 = 120%

Sample 1

Sample 2

S Email

(cont'd) adding an extra server for download

Process Performance Metrics (Continued)

Productivity = <u>Output</u> Input

Utilization = <u>Time Activated</u> Time Available

Suppose you had to produce 600 units in 80 hours to meet the demand requirements of a product. What is the cycle time to meet this demand requirement?

Answer: There are 4,800 minutes (60 minutes/hour x 80 hours) in 80 hours. So the average time between completions would have to be: Cycle time = 4,800/600 units = 8 minutes. Process Throughput Time Reduction

- Perform activities in parallel
- Change the sequence of activities

Reduce interruptions

Flowchart Exercise

 Using flowchart, expand the place item into a plastic bags to highlight set of tasks that includes checking if all items are in bags, than stop packing or else place items into plastic bags. It also includes checking if the bag is full than place the next item into a new bag.

Which of the following are possible examples of "cycle times"?

- a. Time for each television to come off an assembly line.
- **b.** Time it takes for a stock purchase
- c. Time it takes for an instructor to grade an exam
- d. Time it takes to build an automobile
- e. All of the above

Answer: e. All of the above

Which of the following are used as symbols in a Process Flowchart?

- a. **Decision points**
- b. Blocking
- c. Starving
- d. Bottleneck
- e. All of the above

Answer: a. Decision points (A diamond shaped symbol.)

Which type of process is configured as follows?

- a. Single-stage process
- b. Multi-stage process
- c. Make-to-order process
- d. Make-to-stock process
- e. All of the above

Answer: b. Multi-stage process

When an assembly line employee is waiting for a unit of work to come down the line so they can stop being idle and get back to work, it is an example of which of the following process terms?

- a. Buffering
- b. Blocking
- c. Starving
- d. Bottleneck
- e. All of the above

Answer: c. Starving

When a company waits until they have an order for their product in hand before beginning any production for that order, we can characterize their operation as which of the following processes?

- a. Single-stage process
- b. Multi-stage process
- c. Make-to-order process
- d. Make-to-stock process
- e. All of the above

Answer: c. Make-to-order process

If the Run Time for a batch of parts is 45 minutes on a machine, and the Setup Time is 65 minutes, which of the following is the Operation Time?

- a. 75 minutes
- b. 110 minutes
- c. Only 45 minutes
- d. 65/45 minutes or 1.44 hours
- e. Can not be computed on the data above

Answer: b. 110 minutes (Operation Time is the sum of **Run** Time and Setup Time, or 65 + 45 = 110 minutes)

If the standard expected phone calls for a telephone marketers is 24 per hour, and one telephone marketer did 27 per hour, which of the following can be used to describe their Efficiency?

- a. 88.8%
- b. 100%
- c. 112.5%

Allswei . C. 112.3

- (Ratio of actual
- performance/expected performance,
- 2.5% or (27/24) x 100 = 110 minutes)
- d. Well over 150%
- e. Can not computed on the information given.

End of Unit# 5