



## Process Bottleneck Analysis

John W. Moran<sup>1</sup>

March 2017

### Description:

In reference to organizational processes, a bottleneck is a resource working at full capacity and which cannot handle additional demand placed on it.<sup>2</sup> A bottleneck is the point of a process where the flow is constrained, and can be an impediment to the overall process performance.<sup>3</sup> A bottleneck may be suspected when work input is piling up during a process step, and workers in later stages stand idle or work under capacity.

Becoming a lean organization requires orienting your workplace and adjusting your work tasks so that the product or service is always in a state of constant value-adding mode. Efficient operations contribute to bottom-line results, customer satisfaction, and employee morale. Identifying and minimizing bottlenecks is key to your organization's best interests, because this will improve operational results and satisfy your customers.

### When to Use:

The Process Bottleneck Analysis tool should be used when performance data about a process is not meeting expectations, or a process does not keep up with demand. It can also be used when customer surveys are showing a decline in satisfaction, or process-related employee complaints are increasing.

### Construction Steps/Example:

1. Create a Flowchart<sup>4</sup> to depict all process steps from start to finish. *As an example, assume we have a clinic process that, when flow charted, has the following five steps:*
  - Step 1: Client check-in*
  - Step 2: Screening*
  - Step 3: Eligibility determination*
  - Step 4: Service rendered*
  - Step 5: Payment and exit*
2. Calculate the average time for each process step and create a visual representation of the data. *In this example, the time each process step takes is displayed in the figure below.*

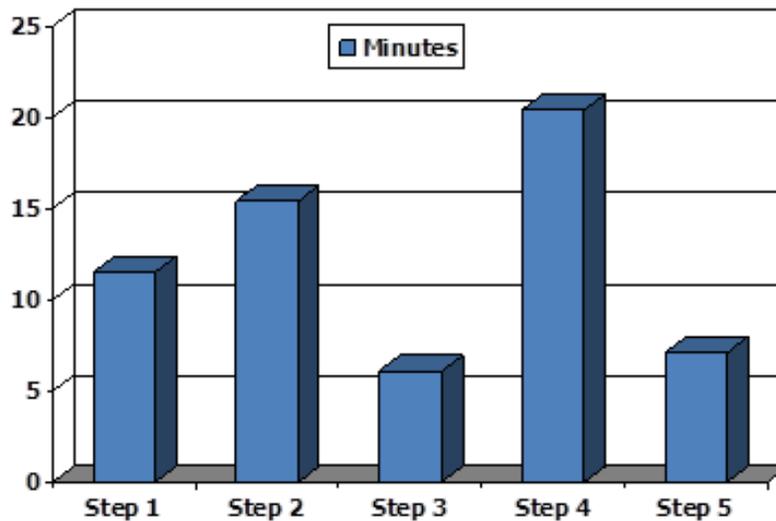
---

<sup>1</sup> John W. Moran, PhD, is Senior Quality Advisor to the Public Health Foundation and Senior Fellow in the Division of Health Policy and Management at the University of Minnesota, School of Public Health. He is a previous member of PHAB's Evaluation and Quality Improvement Committee and Adjunct Professor at the Arizona State University College of Health Solutions' School for the Science of Health.

<sup>2</sup> [Capacity and Bottlenecks](#), Alex Ruiz-Torres, University of Texas at El Paso. Accessed November 29, 2016.

<sup>3</sup> [BusinessDictionary.com](#). Accessed December 7, 2016.

<sup>4</sup> [Public Health Quality Improvement Encyclopedia](#), Public Health Foundation, © 2012, pp. 38-39.



*The data show that Step 4 takes an average of 20 minutes to complete. This is the largest time value among all of the steps.*

3. Determine a target value for each process step. Compare this target value to the current average time for each process step to determine which step(s) are experiencing a bottleneck. For process steps completed in an amount of time acceptable to the organization, no further action is needed. *In this example, a target value of 15 minutes has been established for Step 4. Exceeding this target causes a slowdown for customers in paying and leaving the system, and prevents some from being seen at the end of the clinic day. Currently, all the other steps are performing at their target value.*
4. Determine what impact, if any, the bottleneck step is having on the process steps before and after it, as well as its impact to the overall process. *For example, after studying this clinic process, it was determined that the bottleneck in service rendered (Step 4) prevents some patients from being seen on their appointment day, when they are forced to wait after being determined eligible and the clinic reaches its closing time. This creates a need for these clients to return for services the next day.*
5. Describe the bottleneck in quantitative terms. *For example, “wait time has increased 25% in the last quarter, which resulted in 15% fewer clients seen per day.” This system was designed to process 9 clients per day during the 8 hours they are open. Each client should go through the system in 54 minutes (dividing 480 minutes per day by 9 clients to be seen).*
6. Construct a Cause and Effect Diagram<sup>5</sup> to understand what is causing the bottleneck and determine the root cause(s) that needs to be addressed.

<sup>5</sup> [Public Health Quality Improvement Encyclopedia](#), Public Health Foundation, © 2012, pp. 11-12

7. Initiate a Quality Improvement team to address the root cause(s) of the bottleneck. This team should determine how the capacity of the affected process step can be maximized. The Quality Improvement team should look for ways to improve the bottleneck, such as:
  - a. Shift staff who are idle or underutilized to increase capacity.
  - b. Conduct re-training on the process.
  - c. Rearrange the workplace to improve the flow (e.g., create a Spaghetti Map<sup>6</sup>).
  - d. Increase the hours of operation, such as opening the clinic intake a half hour earlier.
  - e. Remove all non-value added work.
  - f. Reassign some of the work from the affected process step to smooth out the flow.
  
8. After addressing the root cause(s), and strategies are implemented to maximize capacity, reassess the average time for each process step. If there was no improvement, then a complete redesign of the process may be necessary to overcome the bottleneck.

---

<sup>6</sup> [Public Health Quality Improvement Encyclopedia](#), Public Health Foundation, © 2012, pp. 127-128