TMGT 361

Assignment IV Instructions

Lecture/Essay

**DMAIC**

Though touted as something new (even though the acronym has been around for decades), DMAIC is one of many ways of stating the classic problem solving technique. This doesn’t diminish the importance of problem solving (labeled DMAIC or otherwise). Research shows that when you give food new titles more people will eat the food. Rebranding works with consumers. But hey, if you can’t get someone to eat their spinach but you can if you call it hand-foraged greens, go for it. DMAIC doesn’t do anything bad. Quite the opposite, by whatever name, Lean, Six Sigma, DMAIC, and others are important things to do. Maybe we need more rebranding to get more organizations to follow basic principles of management, quality, efficiency, and safety.

In case you didn’t know it, DMAIC stands for the following.

* Define: define the problem, the gap between what is and what should be.
* Measure: collect data. To make very clear the current state (the what is) and the desired state (the what is should be) to further refine the problem, and to collect other data to be used in analyzing, improving, and controlling.
* Analyze: analyze the data. This step focuses on zeroing in on what will likely eliminate the problem (close the gap). Various decision-making tools, e.g., Pareto, risk analysis, and others, are used to identify important quality characteristics (variables) and what the levels should be. Experiments are common at this stage, which usually require more measurement and data analysis.
* Improve: formulate and implement a plan to close the gap, to make the new current state match the desired state.
* Control: maintain the desired state. This requires a plan and monitoring.

All the problem solving schemes follow the pattern above. The number of steps and their names change but every problem solving method starts with a problem and works through the steps of figuring out what to do to solve the problem, then doing it, then checking to see how well the problem was solved.

**Lean**

Lean (L) is a view of efficiency that focuses on work vs waste. Work includes doing all the things that need done using the resources in the best way. Waste includes doing what doesn’t need done. In practice it is common to focus on the waste part of equation; the less waste, the more Lean. Assigning waste decreases efficiency and can lead to lower job satisfaction. You can also raise efficiency by doing more work. However, efficiency and job satisfaction declines when more work is required than can be accomplished. As Figure 1 displays, there is a human side to efficiency affected by management practice. The callouts are to highlight that you cannot arbitrarily state the denominator or numerator; you have to see what’s possible; you have to work at it. Also, values of the denominator and numerator and the methods to achieve those values are not all equal—there are legal, ethical, and physical constraints to what is possible.

Figure 1. Efficiency formula

Individuals have a limit. Can be structured to have greater or less job satisfaction.

Can result in lower job satisfaction by merely doing it.

In the context of LSS, work does not merely refer to activity or accomplishment. “Work” means *adding customer-desired value*. “Waste” is *whatever is not work*. Those definitions may appear simple but there are several nuances with important ramifications that must be understood in order to be more efficient. *Adding* means that something was transformed; there was some kind of change. If an activity or the use of a resource does not add something, it cannot be work; it must be waste. For example, waiting that does not produce a change cannot be work, therefore, it must be waste.

*Customer-desired* means that the end-consumer wanted it and was willing to pay more for it. Though viewing internal personnel as consumers can be a useful metaphor, the true consumers are outside the organization. Regardless of a manager’s desires, an organization’s goals, or laws or regulations, if the end-consumer does not desire it, it is waste.

*Desired* means that customer wants it (not must accept it nor has no better choice). *Value* means that the thing is something that the customer wants to pay for; it has an economic value. The thing can take many forms, e.g., a product purchased or leased, a result, an experience, a guarantee of future use, an option, insurance against an event, and many others. The best evidence of desire is when the customer offers to pay for it, e.g., the customer offers to pay for an additional feature or function. If the customer doesn’t want to bid for it, it is a waste. Pay doesn’t have to be money; the customer can pay by trade, or with time, attention, or other personal resource.

Following is a taxonomy of typical work and waste categories. The callouts provide advice about how to increase the work and reduce the waste.

Focus on quality, standardization, and efficiency.

Just quit doing it!

Short of being fired, say no!

Eliminate by recognizing.

**Activity Network Diagram (AND)**

The book does a good job of explaining an AND. I want to point out that it is a type of flow chart that has the following added to the activity nodes.

* Earliest and latest times an activity can start.
* Earliest and latest times an activity can finish.
* The time it takes to perform the activity.

From the above, it is possible to determine the critical path, the longest time path through the chart/network when every activity on that path happens as soon as possible. The critical path tell you or helps you with the following.

* Defines how quickly it is possible to complete the process.
* By identifying the critical path, tells you what cannot be delayed if you want to finish as soon as possible.
* Tells you how much slack or delay you can have for activities not on the critical path.
* Helps you analyze if you can *crash* (speed up) some activities to finish sooner. Note that it only makes sense to crash the critical path. Note that crashing requires expending more resources (money, overtime, new equipment, outsourcing, etc.). A cost-benefit analysis is needed to determine if crashing is worth it. Note that crashing the critical path can create a new critical path (which may or may not be able to be crashed or may or may not be worth crashing).

**Project Planning Charts**

PERT, Gantt, CPM (which is essentially an AND chart), and many other planning charts are all variants of the basic flow chart. For some, the nodes are activities; for some the nodes are milestones or results. Some focus on the progress of the project, e.g., a snapshot of the actual progress or various steps/nodes compared to the planned progress. Often, more than one chart is used. A Gantt, is often used to chart progress and a PERT or AND is used to show the path. Though the charts are very useful and can contain a lot of information in themselves, a complete plan will have rationale, budget, and other elements as discussed in a previous assignment.

**Taguchi**

Taguchi’s main contribution is to realize, incorporate into quality engineering, and to teach the following.

* Tolerancing is really about hitting the target. There is greater quality loss the more the target is missed. The target (the nominal value) is the aim.
  + Some targets are more is better, some are less is better, some are nominal is best. But even when more or less is better, there is usually a target.
* Processes have parameters (characteristics, variables, factors). Designing a product or process is essentially figuring out what the values (levels) of the parameters should be.
* Some parameters are more important than others.
  + The value of some parameters are harder to achieve or control than others.
  + Some parameters have a big influence on other parameters.
  + Some variables outside of the system (noise, environmental factors) have a big influence on parameters of the process.
* It is often possible to control certain parameters (sometimes easily, sometimes not so easy; easy is the goal) to make a process robust, i.e., where the noise factors have less or little affect and you do not have to be as careful with other process parameters.

Initial Post

See the general assignment instructions for information about the quality and quantity expectations and evaluation criteria.

1. Problem solving and improvement.
   1. Describe a SS problem solving situation.\* Describe specifically what would happen at each step of your example (not just generically, what happens at each of the DMAIC steps).
   2. Summarize Lean; what’s the point of Lean?
   3. Prepare an activity network diagram.\* The task length doesn’t have to be days.
   4. Outline a project using PERT, CPM, or Gantt chart\*.
   5. Define the following terms per Taguchi and describe how they relate to one another: *parameter, signal, noise*, and *robust*. Pick a process and list the parameters of the process; which parameters are signals and which are noise?

\*Remember that though you are supposed to learn from the book and other sources, you are to use your own experiences and real life examples to supply information for the assignment. For any assignment, you cannot merely copy or pattern your example after an internet or text book example (unless you are instructed to do so).

For a, c, and d above, you have to use a real situation with which you are familiar (and not copy or pattern something from the internet or any other source).