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16.9. Plan-Do-Study-Act

Plan-do-study-act (PDSA) is another problem-solving approach many use to find and address root causes of problems. The method was originally proposed by Dr. Walter Shewhart (as PDCA, plan-do-check-act) in his book *Economic Control of Quality of Manufactured Product*(1931) and later espoused by W. Edwards Deming. Deming referred to the method as the Shewhart cycle, but many, particularly after Deming achieved fame, refer to it as the Deming cycle.

The method differs from the root cause analysis method described previously in that it is primarily a guide for identifying root causes through experimentation. This implies that the analysis of symptoms and theorizing of causes are done before the cycle actually starts, and then iterative experiments are performed to drill down to the root causes of the problem being addressed.

The PDSA method is particularly popular in health care organizations, probably due to its promotion by the Institute for Healthcare Improvement (IHI) as a method for finding causes and stimulating improvement.

The work done prior to the actual PDSA cycle starts by "setting aims," which is analogous to the establishment of the goal in the Juran RCCA process. The piece of stating the problem to be solved, however, seems to be absent, so one might wonder how the activity of the team becomes focused. Then the team gathers knowledge about the process they are attempting to improve upon so they can come up with good ideas for changes to the process.

> ... [T]he more complete the appropriate knowledge, the better the improvements will be when the knowledge is applied to making changes. Any approach to improvement, therefore, must be based on building and applying knowledge. This view leads to a set of fundamental questions, the answers to which form the basis of improvement:
>
> - What are we trying to accomplish?
> - How will we know that a change is an improvement?
> - What changes can we make that will result in improvement? (Langley et al., 1996)

In contrast to Juran's RCCA, the PDSA approach seeks to identify changes that might improve the process or outcomes of it, then implements those changes to see if they are effective in producing an improvement. The PDSA cycle is the method applied to this trial of changes. In a manner of thinking, PDSA seeks to confirm or refute ideas of problem causes by trial and error of solutions.

"These questions [above] provide a framework for a 'trial and learning' approach. The word 'trial' suggests that a change is going to be tested. The term 'learning' implies that criteria have been identified that will be used to study and learn from the trial" (Langley et al., 1996).

The PDSA approach follows these phases and steps:

1. Plan
    - Define the change to be tested

- Design the experiment to test the change

2. Do
   - Carry out the experimental plan
   - Collect data about the effectiveness of the change
3. Study
   - Analyze the data from the experiment
   - Summarize what was learned
4. Act
   - Determine what permanent changes are to be implemented
   - Determine what additional changes need to be tested

Clearly, this approach has some advantages:

- It can yield results quickly if the experimenters are good at selecting solutions that will yield true improvement.
- It follows an experimental approach, which can yield a great deal of useful knowledge.
- It is widely accepted, particularly within health care and other organizations that typically rely on experimentation to determine beneficial changes (e.g., development of medications).

One might also note some disadvantages:

- Results can be slow to come if the experimenters are not good at selecting solutions that will yield true improvement.
- Changes that do not succeed may not yield a lot of useful information.
- Experimentation, unless it is done in a laboratory setting, can be disruptive to the process and can be resource-intensive.
- Experimentation can be costly in many cases.

Based on these pros and cons, the project team should choose the methodology that best fits their work style and organization's needs.