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## THE IMPROVEMENT ON THE BASIS OF PDCA AND SDCA CYCLES

**Abstract:** In the chapter it was made analysis of the possibility of improving the organization by using PDCA and SDCA cycles. It was defined what improving the quality is and was introduced possible way to use the PDCA cycle for solving a problem. Different versions of the PDCA cycle were discussed, i.e. PDSA, OPDCA, EPACA, PDAC. It was described a role of the SDCA cycle in the stabilization and the standardization. The chapter shows analysis of the relation among the PDCA cycle and SDCA. It was underlined, that in order to achieve the permanent success in improving should be use together PDCA and SDCA cycles. PDCA means improvement and SDCA is guaranteeing, by implementing the standard, holding improving effects and next their effective spreading.

**Key words:** improvement, cycles of improvement, PDCA, SDCA, the standardization

### 1. The quality improvement with using improvement cycles

#### 1.1. Improvement cycle according to PDCA

Quality improvement according to the ISO 9000 definition is *a part of quality management directed for increasing abilities to fulfil requirements concerning quality* (PN-EN ISO 9000:2006). Introduced, supervised and improved system of quality, management is a chance of the market success, is establishing the way and tools of permanent improvement. The PDCA cycle (circle) is a crucial part of the continuous improvement philosophy. It is also known as the Deming Wheel, Deming Cycle, or Shewhart Cycle in practice. PDCA was made popular by Dr W.

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Edwards Deming, who is considered by many to be the father of modern quality control; however, he always referred to it as the "Shewhart cycle". Later in Deming's career, he modified PDCA to "Plan, Do, Study, Act" (PDSA) because he felt that "check" emphasized inspection over analysis.

PDCA is utilized in all components and requirements of continuous improvement. Deming suggests that PDCA should be a way of performing continuous improvement not only in business but also in as all aspects of one's daily life. Deming presents PDCA as a tool for teams and organizations to increase confidence, acceptance, and prosper in the competition.

The PDCA cycle is presenting the process of constant improvement visually and it consists of 4 successive, sequentially carried out stages: planning - doing - checking – acting (Plan - Do - Check - Act) what Fig. 1 is showing.



*Fig. 1. PDCA cycle.*

Source: <http://prince2-pl.blogspot.com/2014/03/planuj-deleguj-monitoruj-steruj.html>

Individual stages generally depend on:

1. planning – plan what you want to do.
2. doing – make, what you planned.
3. checking – check, what you made, is compatible with your intentions, if not, improve it, and if it is all ok...

4. action – apply to the wide scale. Next then again begin the process of planning improvements.

Below is an example of using the PDCA cycle to improving the quality of trainings:

P – we are making plans for trainings.

D – we are sending workers.

C – employees assess worker trainings, superiors assess employee's assessments of training effectiveness.

D – we are making a decision if we are searching the different supplier of the service, or we are using it, because it is fulfilling our expectations.

The PDCA cycle incessantly is repeating itself.

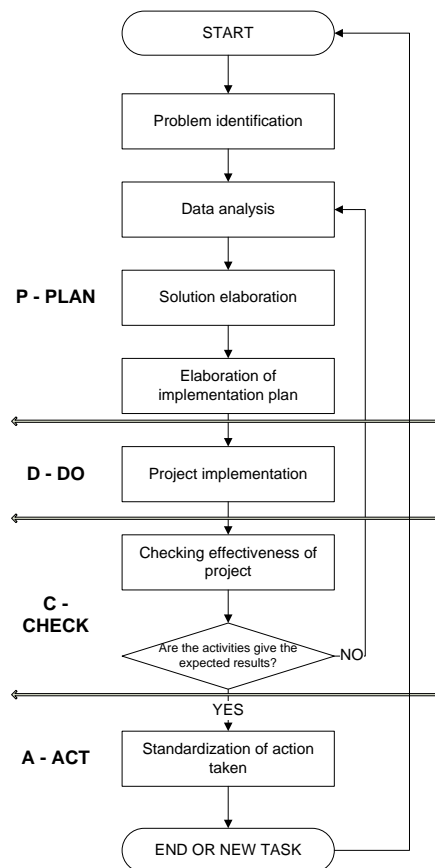
It is possible to use the PDCA cycle for solving different problems, then individual stages mean:

- Plan – characterizing the problem, and then working the plan of the implementation.
- Do – implementing planned solutions and changes in the low scale in order to keep the minimization of threats to current action.
- Check – checking, whether assumed earlier results are being obtained, at permanent observation of crucial processes, whether together with applying solutions new problems do not appear.
- Act – implementing changes in the target scale.

The algorithm of such action is showing Fig. 2

The PDCA method is universal enough, that for it applying and dealing with principles we can it refer to every organization. It is applied as the element of constant improvement the organization (ISO 9000), and peculiarly is being used in widely understood TQM. It is also a base to the improvement in the relation between production plant–environment (ISO 14000:2005).

It is possible to apply the PDCA method to almost every situation in the company, independently of activity profile the enterprise and area of the company activity which we want to improve (PIASECKA-GLUSZAK A. 2012; SZCZEPAŃSKA K. 2011).



**Fig. 2. Algorithm of the PDCA cycle for solving a problem with steps in individual phases.**

Source: ŁAZICKIA., SAMSEL D. (and others) 2011

The PDCA method is being applied in the production to:

- solving a problem,
- organising the team work,

- determining and defining tasks for teams of designers (HAMROL A. 2015).  
PDCA is a entering base of constant improvement, when it concerns:
- imperfections of the enterprise,
- optimizing stores,
- solving a problem.

Is implementing PDCA methodology profitable? How they are establishing the research – absolutely yes. Average turnabout from the one project being based on using this method multiple crossed carried expenditure (ŁAZICKI S., SAMSEL D. (AND OTHERS) 2011).

## 1.2. Variations of the cycle PDCA: PDSA, OPDCA, EPACA, PDAC

One of the version of PDCA cycle is **PDSA (Plan, Do, Study, Act)**. It is improved version of Sherhart's PDCA cycle, which was done by E. Deming. Interpretation of the PDSA cycle Deming is a little bit different, than in case of PDCA cycle:

- P - plan the change,
- D - accustom it in the limited scope,
- S - go deeply (examine) results of experiment,
- A - implement these elements that brought benefits.

Deming was emphatic about the importance of not just checking, but using that knowledge to better understand the product or process being improved – hence his recommendation to use PDSA as a natural evolution of PDCA. PDCA is used for more straightforward improvement scenarios, and PDSA is applied in more complex scenarios – when the metrics that it were checking and the environmental conditions surrounding those metrics required more extensive reflection. CHECK implies that it is asking the question “How does the state of the system compare to what you were expecting?” STUDY, in contrast, requires to ask the question “What can we *learn* from how the state of the system compares to what we were expecting?” The STUDY aspect of

PDSA also suggests that you *take what you learned about the system and use that new information* to better achieve the goals of the product or process in question.

Another version of PDCA cycle is **OPDCA (Observe, Plan, Do, Check, Act)**. The added "O" stands for observation or as some versions say "Grasp the current condition.". Emphasis on observation and current condition is very important in Lean manufacturing/Toyota Production System (LIKER J.K. 2005).

The next version is **EPACA (Evaluate, Plan, Action, Check, Amend)**. In this approach clearly are stressing that improving the organization takes place in more significantly for measure through correcting effective implementing action and preventive.

**PDAC (Plan, Do, Act, Challenge)** is an advanced form of the PDCA cycle, directed for taking new challenges in the scope of improvement the organization by putting ambitious purposes.

### **1.3. Improvement cycle according to SDCA. Meaning „S”, that is standardization**

*“Where there is no standard, there can be no kaizen.”*  
- Taiichi Ohno

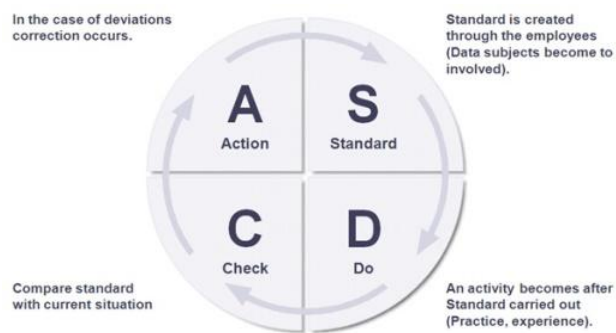
Before applying the PDCA cycle is essential to provide the stability of existing standards. The process of the stabilization is called the SDCA cycle (standardize – make – check – act). SDCA is about ensuring, via audit, that standardized work is being adhered to and is sufficient. SDCA is a methodology to sustain improvements by:

- *Standardize*: Establish standards to be achieved.
- *Do*: Implement standards.
- *Check*: Verify the actual work with standards. Any deviation from the standard should prompt the following 3 questions: Did the deviation occur because no standard exists? Did the deviation occur

because the standard is inadequate? Did the deviation occur because the standard was ignored?

- *Act*: Review and assess any variation in standard.

Meaning of individual action in frames of the SDCA cycle is showing Fig 3.



**Fig 3. The SDCA cycle as the tool of keeping standards.**

Source: <https://kaizeninstituteindia.wordpress.com/2013/08/>

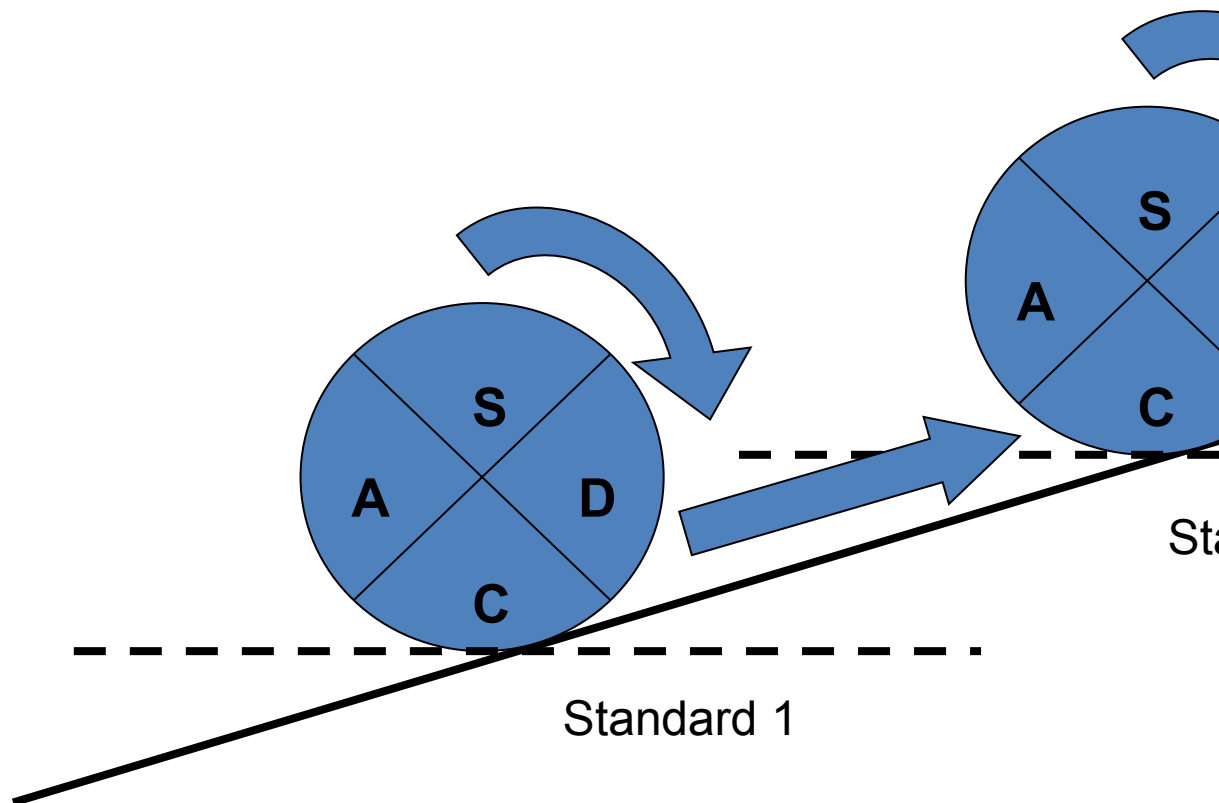
Benefits of SDCA cycle usage:

- Possibility of losses reduces.
- Sustaining improvements becomes easier with SDCA.
- Wastage of time reduced as standards are set for all activities, and there is a clear indication of what is to be done and how it is to be done.
- Helps raise the bar for improvement standards.
- Enable measurement of level of implementation of improvements and standards.
- Helps to sustain lean gains and develop lean culture.

Every process can at the beginning demonstrate deviations and its stability requires effort. It is possible to reach it through the standardization (implementing the standard). Only then, when the standard is enforced and stabilized, it is possible to make it through to the next stage – using the PDCA cycle in order to modify this standard. Any

improvement can be effectively implemented, as long as it is not transformed into a standard which is becoming the object of the planning to the purpose of next improvements.

The SDCA cycle is a tool for legislating standards, supporting them what at the same time is a point of departure in the process of improvement (Fig. 4).



**Fig. 4. The SDCA cycle as the tool of creating and keeping standards.**

Source: [slideplayer.pl/slide/409091/](http://slideplayer.pl/slide/409091/)

The standardization is leading to:

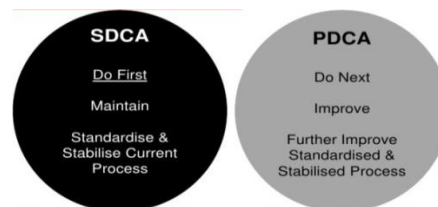


- keeping the stability of the process by carrying repeatable activities in the established sequence of action,
- simplifying a procedure in the enterprise by implementing simple activities for imitating schemes,
- identification and solving problems which are emerging in the process of comparing the agreement of the planned course of the process with the current state.
- constant improvement by process improvement,
- making the work in the most effective way, safe and taking the minimization of the cost level,
- preventing mistakes and minimizing the degree of the changeability,
- simplifications of the process of the subject of the standardization,
- supporting the process through the system of standards guaranteeing the real inspection,
- streamlining the flow of materials on the workstation,
- tidying up the work-place
- gathering the knowledge in the character of the documents connected with the standard work in the enterprise.
- establishing standards of the technological operations realization (KOSIERADZKA A., KRUPA A. 2009).

According to t M. Imai standards mean practicing safest and simplest processes for workers what should be most effective from a point of view a costs, the elimination of the wastage and the productivity (IMAI M. 2006). The created standard must exactly in the rigorous way appoint and describe determined requirements and must be understandable, bright, legible and warned by workers. Without the standard as a point of reference, it is not possible to determine it, what improvements the given operation needs and whether the concrete change is an actual improvement (KÓRNICKI L., KUBIK SZ. 2008).

## **2. Relation among the PDCA cycle and SDCA**

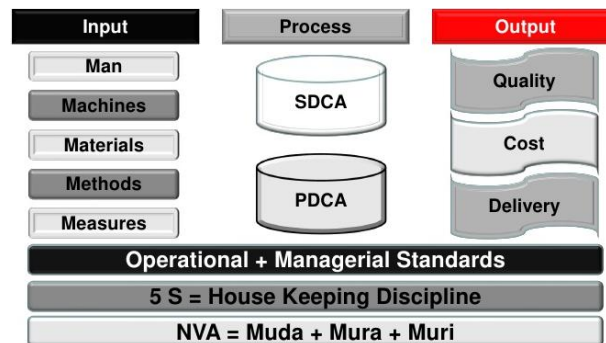
It is possible to point the following relation between PDCA and SDCA cycles: the PDCA cycle is an essential tool of streamlining, next the SDCA cycle is giving the certainty that effects of these improvements will be long-lasting. The PDCA cycle is realized as the process, where new standards are being created only for correct them and replace new, better. The relation among PDCA and SDCA cycles was presented in Fig.5



**Fig. 5. Basic meaning of SDCA cycles and PDCA.**

Source: <http://www.slideshare.net/anandsubramaniam/gemba-kaizen-9942365>

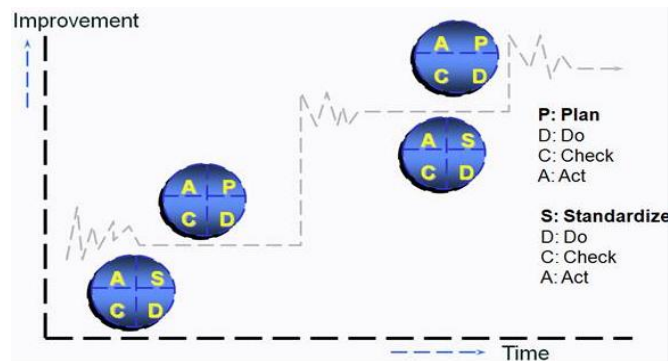
PDCA cycles and SDCA are basic techniques used for improving processes in the conception Gemba Kaizen what was presented in the form „ of house ” of system Gemba Kaizen in Fig.6.



**Fig. 6. PDCA cycles and SDCA in improving processes according to Gemba Kaizen.**

Source: IMAI M. 2006, IMAI M. 2007

Cooperating of the PDCA cycle and SDCA around kaizen and with maintenance is showing Fig. 7.



**Fig. 7. Cooperating of the PDCA cycle and SDCA with improving (kaizen) and with maintenance.**

Source: IMAI M. 2007

The PDCA cycle guarantees improving, next SDCA is holding effects of such improving (is standardizing given area provided with improving). Constant improving should be developed as the maintenance and correcting standards of the work through small and gradual improvements. In the strategy Kaizen the responsibility for keeping standards is falling on workers, while behind the improvement in standards they meet the training wall (RUDNICKI J. 2011).

### 3. Summary

Describing the role of PDCA and SDCA cycles was a purpose of the chapter in improving the organization, its processes, in solving different kind of problems. It was showed that PDCA and SDCA cycles are universal, mighty to apply them in almost every situation, when it is facing some to do task or the problem for solving. It can be used for every profile of enterprise activities that to be subject to improvement.

In the chapter was emphasized that improvement should embrace not only improving action but also standardizing given activity action, area, the problem. These are activities that it is necessary to realize alternately. In the chapter emphasized that it was not possible all the time „to roll” PDCA wheels, without legislating the standard (optimum), that is without implementing into the improvement process of the SDCA cycle. If all the time we are improving processes, without the standardization of our improvements, we will reach nothing, our results, successes in this area will be left sooner or later forgotten, driven by workers, they will not happen „status quo” and we will not be able to diffuse them to different areas.

Improving action should be leaning against the improvement cycle of projects which should always end with legislating the standard. Then such action will only cause intended effects.

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