

Process improvement plan essay

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Process Improvement Plan

Statistical Process Control (SPC) is the technique of using statistical tools in the process control, which aims to ensure that the process conforms to the original specifications and operates at full efficiency. It was introduced by Walter Shewhart in the 1920s, however the first extensive use of SPC was conducted by Edwards Deming, the pioneer of the Total Quality Concept, during the World War II. The main instruments of the SPC are the control charts, which aim to detect non-desirable changes in the processes. These changes may be a difference in variation of the process parameters or the accuracy of the process (Keller, 2012).

The variation of the process is measured as a standard deviation of the parameters, used to evaluate process performance. The deviation should be considered both for the individual measurements and for their average. However, before any adjustments can be made, it is necessary to determine whether variation occurs due to common or special (assignable) causes. Common cause variation usually arises due to inherent process qualities and therefore it cannot be modified by further process adjustment. Assignable causes on the other hand arise due to unexpected conditions, and therefore they are not considered in the planning process (Pham, 2006). The focus of SPC is to detect the special causes of the process variation and to modify the process in such a way, that the impact of the variation is minimized. However, in order to start process modification it is necessary to establish that process variation occurs indeed due to special causes. Failure to examine process dynamics and to identify common causes might lead to

undesirable process modifications, which will further result in even greater process variations. Distinguishing between common and special causes is usually conducted through control charts (Levinson, 2011). In order to implement SPC effectively, process has to be continuously monitored and mapped. Any modifications to the process have to be further examined and evaluated in order to ensure continuous process improvement and quality assurance. For the data analysis purpose a centre line is drawn at the mean value of the data points, which indicate process performance parameters. In the next step standard deviation is calculated for these data points. In case the data are not distributed normally, it is possible to consider the average values instead of the absolute, as according to the central limit theorem these data will be distributed normally. At the 3σ (3 standard error) distance from the central line, which defines process capability, the control limits are established. These values indicate the upper and lower thresholds of the parameter, and the variations within these limits is usually considered to take place due to common causes. In this case no action should be taken to modify the process according to the logic of the SPC. However, if the values are outside of the control limits, further investigation of the causes should be conducted. The special causes of such variation have to be examined and eliminated in order to achieve process stability. Statistical explanation of the control chart is based on the fact that the probability of the variation to occur due to special causes is approximately equal to the probability of the variation due to common causes on the control limit line. The further outside of the control limits data point are located, the higher the probability of the special cause variation in the process. Therefore, the further these data

points are from the control limits, the more attention should be paid to the investigation of their causes. Apart from the process capability lines, control charts may also include additional specifications, which represent an early warning of the problem or establish more strict requirements of the process conformity (Diaz, 2008). In order to quantify process stability Cp and Cpk indices are applied. Cp value is calculated as the difference between the upper and lower specification limits divided by 6σ . Cpk is equal to the absolute value of the minimum difference between the average of the values and the upper or lower specification limit divided by 3σ (Keller, 2012).

SPC for the process of responding to the patient's claim

Based on the analysis of the process of checking the medication availability, it has been identified that the average waiting time for all processes is 30 min. However, based on the specified requirements, the time it takes for the process needs to be reduced to 10 min in order to assure efficiency and reduce costs. First, the running time of each process needs to be recorded and plotted on a control chart. In the next step, the deviation from the 10 min limit should be investigated. If the reasons behind long waiting times are inherent to the process, the variation is due to common causes and the process should not be adjusted. In this case process improvement requires redesign, rather than readjustment. If, however, the distribution of waiting time is outside control limits, the variation is caused by special causes, which have not been planned and are highly undesirable. In this case, the cause should be investigated and eliminated. Thus, for example if the waiting results from the slow operation of the server due to recent hardware problems, server performance should be evaluated and improved in order to

obtain the desired results. It is crucial to continue monitoring performance of the processes even after the desired 10 min have been achieved, in order to assure constant improvement and quality control. Control chart should be also adjusted based on the seasonal or daily variations of the processes. Thus, if the capacity of the server is reduced in the day time because many people use it simultaneously, the control limits should be readjusted. In case this is not done, the control charts would show multiple data points outside of the specified limits, thus implying special causes of process variation. Adjusting the process based on such information might be detrimental for the overall performance, thus variations based on time should be always incorporated into the analysis. Moreover, significant results can be only obtained if multiple data points are collected. The larger the sample size, the lower the chance of sampling error of the capability index, therefore the more precise the evaluation of the process variability is.

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