30,000-foot-level Charting: Attribute Data

By Forrest W. Breyfogle III

Attribute, pass/fail proportion data, can be monitored over time for stability and then, when a process is stable, provide a prediction statement.

Consider that the attribute proportion data in Table 1 were collected using an infrequent subgrouping/sampling plan, which is consistent with a 30,000-foot-level charting methodology[1]

Traditionally a p-chart methodology would be used to track this type of data over time; however, there are issues with this approach as described in P-charts: Issues and Resolution.

Day	Non-conformances	Subgroup size	Non-conformance rate
1	287	10,000	0.0287
2	311	10,000	0.0311
3	222	10,000	0.0222
4	135	10,000	0.0135
5	188	10,000	0.0188
6	175	10,000	0.0175
7	142	10,000	0.0142
8	215	10,000	0.0215
9	272	10,000	0.0272
10	165	10,000	0.0165
11	155	10,000	0.0155
12	160	10,000	0.0160
13	224	10,000	0.0224
14	245	10,000	0.0245
15	103	10,000	0.0103
16	273	10,000	0.0273
17	294	10,000	0.0294
18	217	10,000	0.0217
19	210	10,000	0.0210
20	241	10,000	0.0241

From Table 13.1, *Integrated Enterprise Excellence Volume III - Improvement Project Execution: A Management and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, Forrest W. Breyfogle III, Bridgeway Books/Citius Publishing, Austin, TX, 2008.

Table 1: Time-Series Data from Process

The 30,000-foot-level chart, as shown in Figure 1, indicates that the process is stable. When a process has a recent region of stability, it can also be said to be predictable. When this occurs, we can use historical data to make a statement about what we might expect in the future, assuming things stay the same; e.g., the center line of the chart if no transformations are needed to create the 30,000-foot-level chart, and the subgroup sizes are approximately the same.

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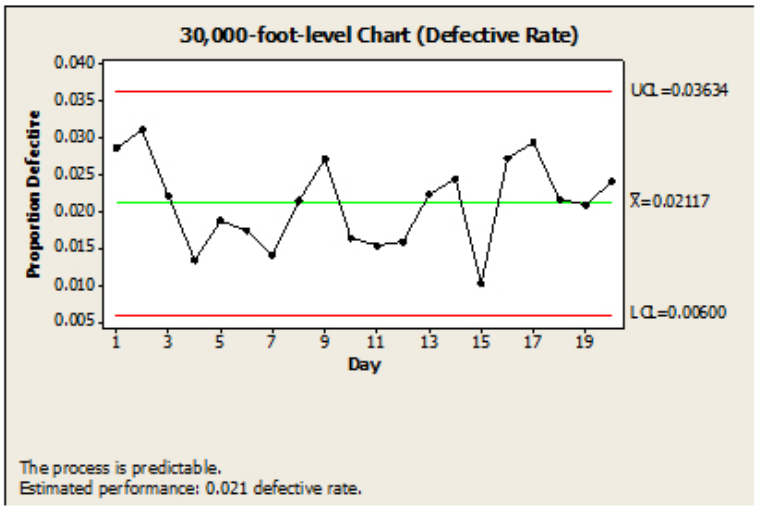

Modified from Figure 13.4, *Integrated Enterprise Excellence Volume III - Improvement Project Execution: A Management and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, Forrest W. Breyfogle III, Bridgeway Books/Citius Publishing, Austin, TX, 2008.

Figure 2: 30,000-foot-level Chart of Non-conformance Rate[2]

The process capability/performance metric for this process can be said to have a non-compliance rate about 0.021, which is noted at the bottom of the chart. That is, since the process is in control/predictable, it is estimated that the future non-conformance rate will be about 0.021, unless a significant change is made to the process or something else happens that either positively or negatively affects the overall response. This situation also implies that Band-Aid or firefighting efforts can waste resources when fundamental business process improvements are really what are needed.

If improvement is needed for this 30,000-foot-level metric, a Pareto chart of defect reasons can give insight to where improvement efforts should focus. The most frequent defect type could be the focus of a new Lean Six Sigma project. For this Lean Six Sigma implementation strategy, one could say common-cause measurement improvement needs are pulling for the creation of a Lean Six Sigma project.

Reference the article P-charts: Issues and Resolution for a more detailed explanation of the methodology summarized in this paper.

30,000-foot-level Charting Applications

The described 30,000-foot-level charting technique has many applications, as described in 30,000-foot-level Performance Reporting Applications.

References

1. Forrest W. Breyfogle III, *Integrated Enterprise Excellence Volume III - Improvement Project Execution: A Management and Black Belt Guide for Going Beyond Lean Six Sigma and the Balanced Scorecard*, Bridgeway Books/Citius Publishing, 2008
2. Figure created using Enterprise Performance Reporting System (EPRS) Software

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About the Author
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In a professional career spanning over a quarter century, Forrest Breyfogle has established himself as a leading edge thinker, a prolific author, an innovative consultant, a world-class educator, and a successful business executive. His work is documented in eleven books and over ninety articles on the topic of quality improvement.

A professional engineer, Forrest is also a member of the board of advisors for the University of Texas Center for Performance Excellence. He is the founder and CEO of Smarter Solutions, Inc., an Austin, Texas based consulting firm offering business measurement and improvement consultation and education to a distinguished list of clients worldwide, including BAMA, CIGNA, Dell, HP, IBM, Oracle Packaging, Sherwin Williams, Cameron, TIMET, and TATA. He served his country on active duty in the US Army for 2 years, and has played an active leadership role in professional and educational organizations. Forrest received the prestigious Crosby Medal from the American Society for Quality (ASQ) in 2004 for his book, *Implementing Six Sigma* (second edition). This award is presented annually by the American Society for Quality to the individual who has authored a distinguished book contributing significantly to the extension of the philosophy and application of the principles, methods, or techniques of quality management. Mr. Breyfogle was named Quality Professional of the Year for 2011 by Quality Magazine and in 2012 was awarded alumni of the year by Missouri University of Science and Technology.

He is a widely recognized authority in the field of management improvement and is a frequent speaker before professional associations and businesses. His earlier work in the field of management science has been widely acclaimed. A previous book, *Implementing Six Sigma*, sold over 40,000 copies and still ranks among the top Amazon books in Applied Mathematics/Engineering Statistics and Industrial Engineering /Quality Control.

He founded Smarter Solutions in 1992 after a 24-year career at IBM. The associates of Smarter Solutions specialize in helping companies throughout the world improve their bottom line and customer satisfaction through the implementation of techniques that are beyond traditional Lean Six Sigma and the balanced scorecard methodologies. His latest and most extensive work has been in the documentation of a new system of enterprise management, the Integrated Enterprise Excellence (IEE) system, in a series of four books. IEE provides a detailed roadmap that builds on and integrates the best practices of earlier disciplines like Six Sigma, Lean, TQM , PDCA, DOE, and TPS combined with innovative analytical tools to produce improvements at the highest level of an enterprise.

In addition to assisting hundreds of major clients in the wise implementation of improvement systems worldwide, Forrest has also developed over 300 hours of classroom instruction used to train executives, managers, and Black Belt practitioners to plan for, implement, and manage IEE systems. He also leads formal seminars and workshops worldwide.

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