Crosswind Learning

Version 6.1 Updated for the 2021
Project Management Professional (PMP)® Exam

Crosswind Success Series: PMP® Exam Bootcamp Manual

www.crosswindpm.com
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Version 6.1 aligned with the Project Management Institute, *A Guide to the Project Management Body of Knowledge, (PMBOK® Guide)* - Sixth Edition, Project Management Institute Inc., 2017

13.10.9. Rolled Throughput Yield (RTY)

Rolled Throughput Yield (RTY) is a term used in Six Sigma to describe the probability that a unit can pass through a process without defects. It is the product of the first pass yields (Y) at each step:

$RTY = Y_1 \times Y_2 \times Y_3 \times .. Y_n$

In the following example, there are three stages to the process performed on 100 units. In stage one, the 100 units have 10 defects resulting in a 90% (0.9) RTY. In stage two, the remaining 90 units have 18 defects, resulting in an 80% (0.8) RTY. In stage three, the remaining 72 units have seven defects, resulting in a 90% (0.9) RTY. The cumulative affect of the three stages (0.9 x 0.8 x 0.9) is 0.648.

Process Stage	Units	Defects	RTY
1	100	10	0.9
2	90	18	0.8
3	72	7	0.9
Results	65	35	0.648

13.11. The Basic Tools of Quality

The basic quality tools are used to resolve quality issues. They include check sheets and checklists, flowcharts, histograms, Pareto diagrams, scatter diagrams, control (run) charts, cause-and-effect diagrams, and the Five WHYs.

13.11.1. Check Sheets and Checklists

Check sheets are tools used to capture and categorize quantitative or qualitative data.

Check sheets can be used for tracking such items as instances of process failure in specific areas over a specific period of time. The example in Figure 13-7: Check Sheet depicts the daily calls received by a business.

Reason	Mon	Tues	Wed	Thurs	Fri
Wrong Number	3	5	2	1	3
Info Request	12	10	12	13	16
Sales Order	15	15	20	18	13
Boss	4	4	4	5	8
Total	34	34	38	37	40

Figure 13-7: Check Sheet

The source for the above figure is the Project Management Institute, *A Guide to the Project Management Body of Knowledge*, (*PMBOK® Guide*) – Sixth Edition, Project Management Institute Inc., 2017, Figure 8-12, Page 302

Checklists are tools used to ensure that all process steps have been completed as planned. The use of checklists can improve quality and eliminate defects.

13.11.2. Flowcharts

Flowcharting is a technique used in Plan Quality Management to map the flow of a process or a technique. Flowcharting can improve quality by increasing the stability and repeatability of a process.

The flowchart (sometimes called a process flow) is a good tool for defining, in proper order, the steps that need to be completed to achieve a particular goal or output. There are a variety of flowchart formats including the **SIPOC (Supplier, Inputs, Process, Outputs, Customers} model.**

The following image depicts a generic flowchart.

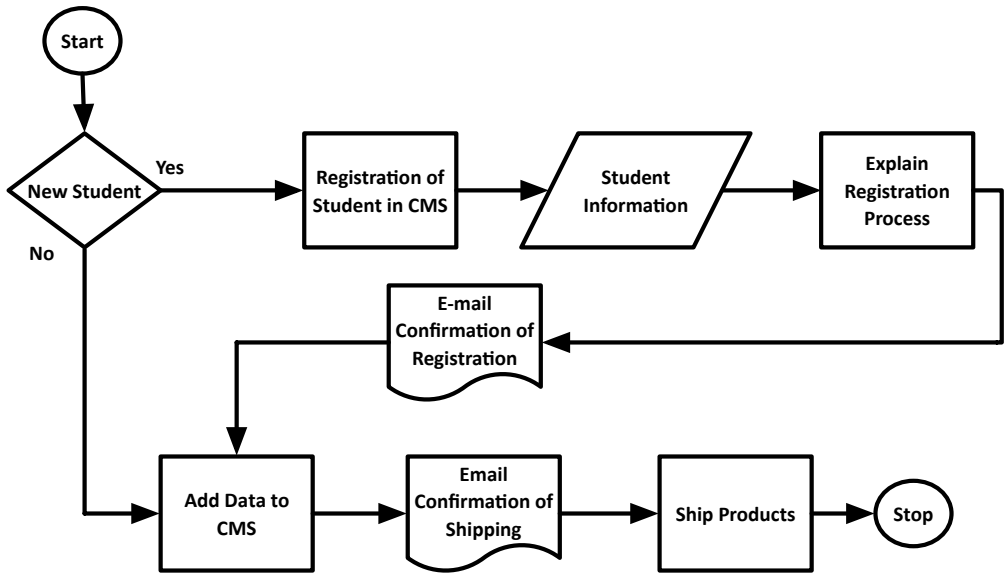

Figure 13-8: Flowchart Sample

The source for the above figure is the Project Management Institute, *A Guide to the Project Management Body of Knowledge*, (*PMBOK® Guide*) – Sixth Edition, Project Management Institute Inc., 2017, Figure 8-6, Page 285

13.11.3. Histogram

A histogram is a bar chart that indicates the frequency at which a characteristic occurs. The columns represent a characteristic and the height of the bar in each column represents the frequency of that characteristic's occurrence. Figure 13-9: Histogram Sample shows defects by count, not severity.

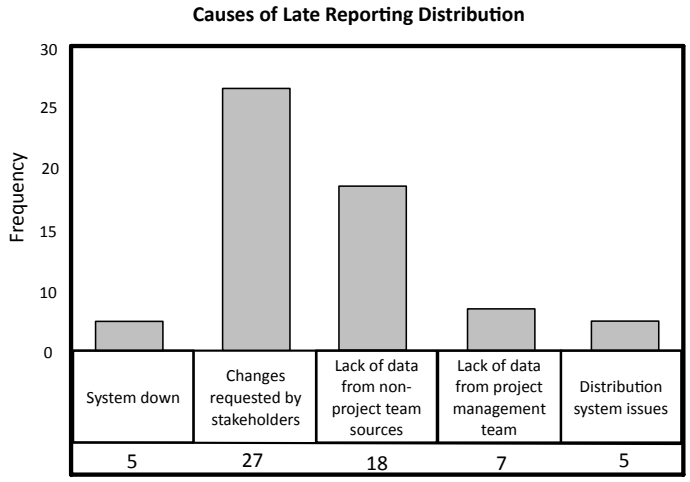

Figure 13-9: Histogram Sample

13.11.4. Pareto Diagram

Know the characteristics of a Pareto diagram.

The Pareto diagram is **a cumulative histogram that can be used to determine the most common issues/defects ordered by the frequency of their occurrence. This diagram also depicts a cumulative percentage of issues/defects.**

The Pareto diagram typically reflects the 80/20 rule, which states that, as a general rule, 80% of the problems arise from 20% of the issues/defects.

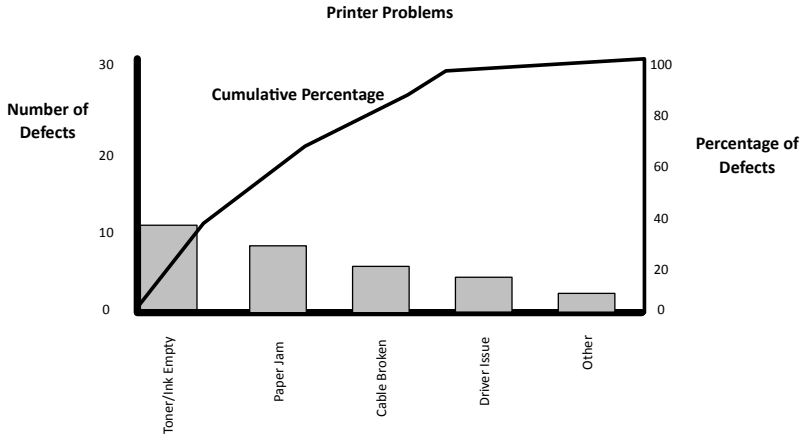

Figure 13-10: Pareto Diagram Sample

13.11.5. Scatter Diagram

Know the characteristics of a scatter diagram.

The scatter diagram **shows a pattern between two variables associated with a process.**

The purpose of the diagram is to **show any correlation** that might exist between the variables.

The closer the output represents a diagonal line, the more dependent the variables are.

The less the output resembles a diagonal line, the more independent the variables are.

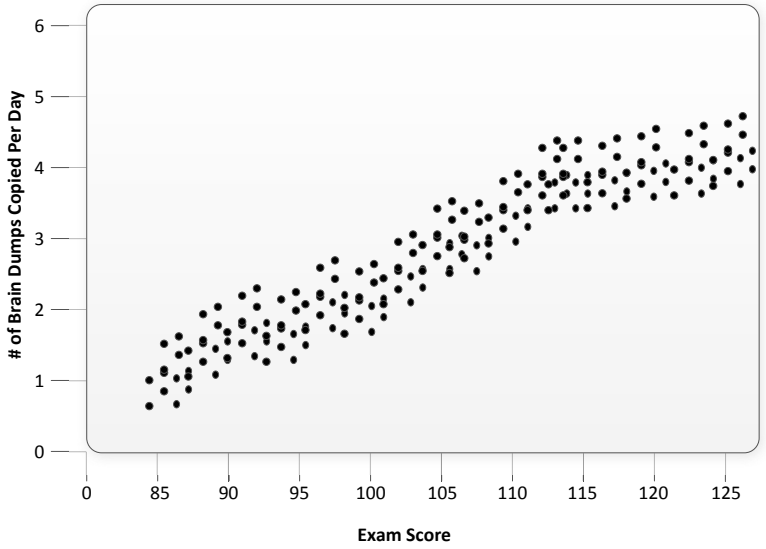

Figure 13-11: Scatter Diagram Sample

13.11.6. Control Chart (A Form of Run Chart)

Learn the principles and components of a control (run) chart, including the upper and lower control limits, upper and lower specification limits, and the mean.

A control chart (a form of run chart) depicts the **process output over time.** It can be used to track technical performance, schedule performance, or cost performance. The primary difference between a run chart and a control chart is that the control chart has defined control and specification limits, whereas the **run chart's limits may be adjusted**.

The **upper and lower control limits** represent the control points of the process. The process is under control if the data falls between the lower and upper control limits. This applies in all but one case: the Seven Run Rule (the Glossary contains information regarding the Seven Run Rule). **Typically, the upper control limit (UCL) and lower control limit (LCL) are set at +/- 3 sigma.**

The upper and lower **tolerances,** sometimes called **upper (USL) and lower (LSL) specification (spec) limits, are customer established and can be inside or outside the control limits**. The process outcome is acceptable if the data falls between the lower and upper tolerance limits.

To understand control chart terminology, consider a road. The **mean** is the middle of the road, the **control limits** are the stripes on the outer edge of the road, and the **tolerance limits** are the actual edges of the road.

Figure 13-12 Control (Run) Chart Sample, shows a control chart with limits, tolerances, and the mean. The mean, located in the middle of the chart, represents the target measurement.

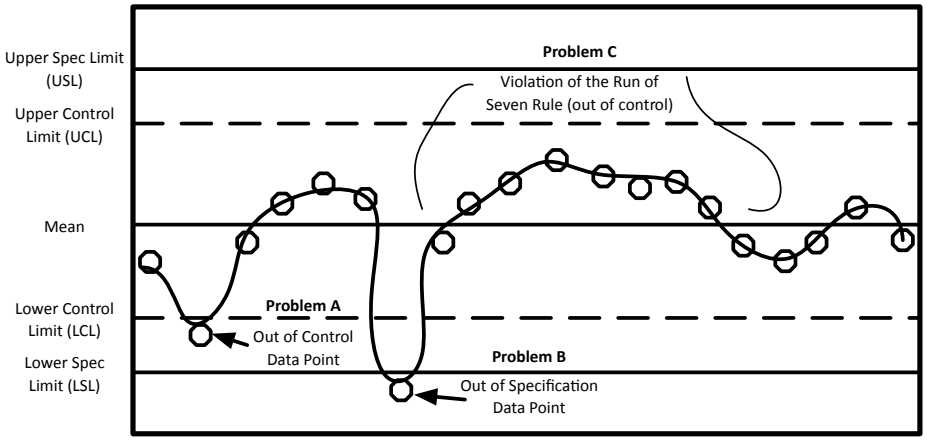

Figure 13-12: Control (Run) Chart Sample

13.11.7. Cause-and-effect (Ishikawa, Why-Why, or Fishbone) Diagram (Fish shape optional)

Understand what a Cause and Effect (Ishikawa or fishbone) diagram is and in what environment it is used.

A cause-and-effect (Ishikawa, Why-Why, or fishbone) diagram is a tool used at the start of the project to **evaluate what could potentially cause defects** in a project or process.

After the project has started, it can be used to **review symptoms and determine the real problem (continue to ask questions until the root cause is determined)**.

Creating this diagram follows the same logic as decomposing work.

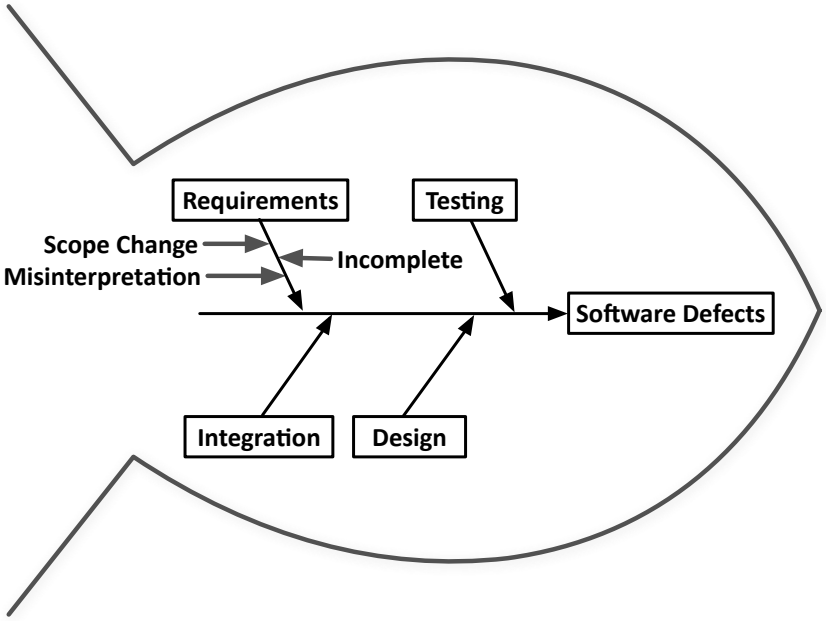

Figure 13-13: Cause-and-effect Diagram

The source for the above figure is the Project Management Institute, *A Guide to the Project Management Body of Knowledge*, (*PMBOK® Guide*) – Sixth Edition, Project Management Institute Inc., 2017, Figure 8-9, Page 294

13.11.8. The Five WHYs

The Five WHYs is a technique used to determine the root cause of a quality defect. When a quality defect is discovered, ask "Why?" No matter what the answer is, ask "Why?" again. **Repeat this as needed until you discover the defect's root cause**, rather than uncovering a symptom. Typically, five Whys are needed to determine the root cause.

The source for the above text is the Project Management Institute, *A Guide to the Project Management Body of Knowledge*, (*PMBOK® Guide*) – Sixth Edition, Project Management Institute Inc., 2017, Pages 298-306