

Boise State University
Semester: Fall, 2002
Class: OPEMGT 345
Instructor: Dr. Tom Foster

Run Chart

Student: Kanaka Siek
ID: 111604269

Date: November 14, 2002

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Introduction

In the current competitive world, most companies focus on Total Quality Management (TQM). For a company to remain competitive, quality must remain a priority. To assess your business's quality health, tools such as histogram, control chart, or Run chart are used. Run chart can be used in the implementation of total quality management in the company.

What is a Run chart?

A Run chart is a simple graphic representation that displays data in the order that they occur and shows a characteristic of a process over time. It is often known as a line chart or a line graph outside the quality management field. To create Run chart, you can use the popular commercial spreadsheet software such as Microsoft Excel, Lotus 1-2-3, or Borland Quattro.

What is Run chart used for?

Run chart is used to understand the trends and shifts in a process or variation over time, or to identify decline or improvement in a process over time. In a run chart, events, shown on the y-axis, are graphed against a time period on the x-axis. For example, a run chart in a restaurant might plot the number of customers served against the time of day or day of the week. The results might show that there are more customers at noon than at 3 p.m. and more during weekend than during weekday. Investigating this phenomenon could unearth potential for improvement as to how many waiters and waitresses should be employed during those time for better customer service.

History of Run chart

Run charts originated from control charts, which were initially designed by Walter Shewhart. Walter Shewhart was a statistician at Bell Telephone Laboratories in New York.

Shewhart developed a system for bringing processes into statistical control by developing ideas, which would allow for a system to be controlled using control charts. Run charts evolved from the development of these control charts, but run charts focus more on time patterns while a control chart focuses more on acceptable limits of the process.

Steps to construct a Run chart

1. **Decide what to measure:** Determine what you need to measure and in what unit. Measurements must be taken over a period of time.
2. **Gathering data:** The data must be collected in a chronological or sequential order. You may start at any point and end at any point. However, for best results, at least 25 or more samples (data points) must be taken in order to get an accurate run chart.
3. **Organizing data:** Once you have data in place, you can divide it into two sets of values x and y . The values for x represent time and the values for y represent the measurements you want to measure.
4. **Creating the graph:** Using appropriate scale to make the points on the x and y -axis. You can do this by hand or by computer. Then plot the data points on the chart (the x values versus the y values) in the order in which they became available and connect the points with lines between them. You can draw the average line to evaluate the movement of the data points relative to the average.
5. **Interpreting data:** After drawing the horizontal and vertical lines to segment data, interpret the data and draw any conclusions as to what action to take. Some of the possible outcomes are trends in the chart or cyclical patterns in the data. The key is to look for trends, and not focus on individual plot points.

How to tell whether shift, trend, or pattern occurs

If you have at least 25 or more data points in the analysis, you can use run chart to detect special causes, which is something beyond the usual variability of the process that acts on the process.

- **Shifts:** If eight or more consecutive points fall on one side of the center line, that indicates a special cause may have influenced the process. Points on the average line don't count.
- **Trends:** Six consecutive jumps in the same direction indicate that a special cause may be acting on the process to cause a trend. Flat line segments are not included.
- **Pattern:** If you see a pattern that recurs eight or more times in a row, it is recommended that you look for a special cause.

Run Chart Example

To get a better understanding of what Run chart is and what it is used in the real world, we need to look at an example. Here is the scenario: You have just moved into a new area that you are not familiar with. You want to arrive at work on time. However, from the past few weeks, you noticed that it didn't take the same amount of time each day of the week. You decide to monitor the amount of time it takes to get to work over the next four weeks and construct a run chart.

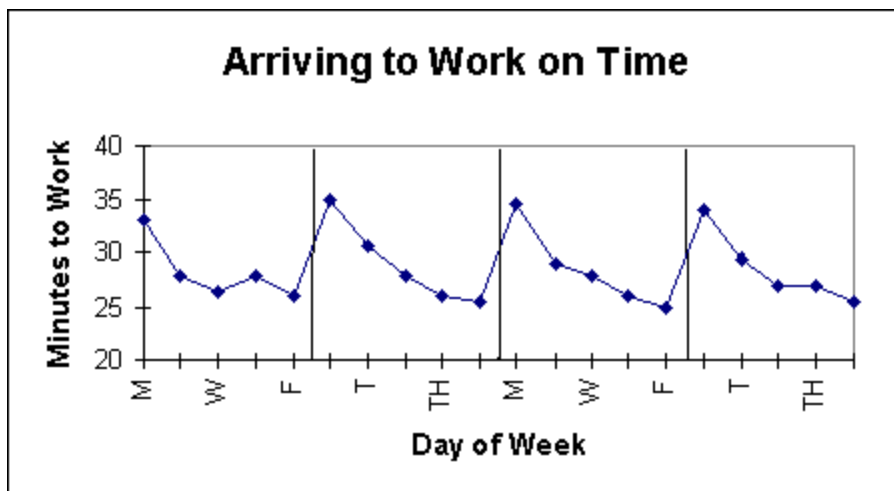
1. Decide what to measure: to see whether it takes the same amount of time to get to work over a week.
2. Gathering data: Collect and record measurements each day over the next four weeks in chronological order.

M	T	W	TH	F	Week1	33	28	26.5	28	26...
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3. Organizing data: Determine the values for the x-axis (day of week) and the y-axis (minutes to work). Below is the table of the data for the 4 weeks:

	Day	Travel Time
WEEK 1	M	33
	T	28
	W	26.5
	TH	28
	F	26
WEEK 2	M	35
	T	30.5
	W	28
	TH	26
	F	25.5
WEEK 3	M	34.5
	T	29
	W	28
	TH	26
	F	25
WEEK 4	M	34
	T	29.5
	W	27
	TH	27
	F	25.5

4. Graphing: Using the appropriate scale, plot the y values versus the x values. Draw vertical lines on the graph to separate days in those 4 weeks.



5. Interpreting data: Interpret results and draw any conclusions that are important. From the graph, it is obvious to conclude that Mondays take the most amounts of time and Fridays generally take the least amount of time. Therefore you accordingly allow yourself more time on Mondays to arrive to work on time.

Common misinterpret Run chart

Some common mistakes to avoid when evaluating run charts include

1. You conclude that some trend or cycle exists, when in fact you are just seeing normal process variation (and every process will show some variation).
2. Even though a trend or cycle exists, you don't recognize it.

Both of these mistakes are common, but people are generally less aware that they are making the first type, and are tampering with a process, which is really behaving normally. To avoid mistakes, use the following rules of thumb for run chart interpretation:

1. Look at data for a long enough period of time, so that a "usual" range of variation is evident.
2. Keep a record of external factors and events that may influence the outcomes (e.g. when a clinician is absent because of illness).
3. Is the recent data within the usual range of variation?
4. Is there a daily pattern? Weekly? Monthly? Yearly?

Conclusion

Run chart is one of the simple tools to use to get a quick understanding of a process behavior. If interpreted correctly, you can use it to see what part of the process needs to be improved, or whether the improvement that we have been put into place is effective.

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