**Run chart and histogram**

**Description**

Different types of chart provide different perspectives of process performance. Even when displaying the same data, one type of chart may identify aspects that another simply fails, or is incapable, to spot. To ensure that any analysis is comprehensive choose complimentary charts to analyse process performance.

Two such complimentary charts are the histogram and run chart. Histograms display the frequency (occurrence) of data and are used to analyse variation and anomalies in the shape of the distribution. Run charts display the same data, but in chronological order, providing a view of process stability over time.

Used in isolation, the histogram may hide changes in performance over time. Likewise the run chart may hide the shape of distribution and thus fail to uncover underlying characteristics of process behaviour.

Used together they form a powerful dashboard to review process performance. The run chart will highlight any trends and special cause and the histogram will show whether the process is stable and capable of meeting the customer's expectation.

If data is collected in sequential order, both the run chart and histogram can be generated from the same source data providing a quick and fuller appreciation of process performance.

**Where to use**

- To appreciate all aspects of process performance
- To uncover the root cause of process performance
- To assess sustainability of process performance
- To compare before and after process performance

**How to use**

1. Implement a data collection plan to gather at least 50 concurrent (or systematically sampled) individual data points
2. Construct both a run chart and histogram from the same data collected
3. Assess the stability of process performance by looking for any patterns or trends in the run chart
4. Look for any unusual data points on the run chart and seek to uncover their cause
5. If 'special causes' are detected denote on the run chart and implement any actions to avoid future re-occurrence
6. Compare the shape of the distribution using the histogram with the customer specification limit to assess whether the process is capable of meeting the customer expectation
7. From the analysis determine appropriate solutions and improvement actions
Handy tips

Keep a record of the time order in which data is captured so not to lose its chronological sequence.

An increase or decrease of more than 8 data points in a row on a run chart indicates a trend in performance.

Seek the root cause of any apparent special cause and mark on the run chart for future comparison.

Compare the histogram to the normal distribution (bell curved and symmetrical) to identify anomalies in process behaviour.

Knowledge of the data itself does not provide insight into potential improvements. Always compare the charts to local knowledge of the process.

Example application

A data collection system was implemented to gather data across two business centres responsible for processing accident claims for a large insurance firm. The data included ‘time to resolution’ for every closed claim, plotted monthly in a histogram and provided to the management team for ongoing review.

Up to now, the resolution time across both business centres was roughly equivalent, measuring on average 15 days from the time of receipt of all documents to resolution. Yet during the last month, the histogram showed increasing variation within one business centre.

Although the average resolution time remained close to 15 days, the Customer Relationship Manager was concerned that the apparent increase in variation would negatively affect the customer’s perception of the service. He immediately sent an email to the Operations Manager of the business unit outlining his concern.

On receipt, the Operations Manager invited the Customer Relationship Manager to tour the business centre and see for himself the operation and the work his team were doing.

On arrival the Customer Relationship Manager was surprised to see the organised nature of the operation, with minimal bottlenecks and what appeared to be good utilisation of all the staff. When asked how they found the work, overall they seemed pleased and confident in their service provided.

Afterward the Operations Manager called the Customer Relationship Manager over to the visual management board to talk through the performance. The board included a number of charts showing past and current performance, including the histogram the Customer Relationship Manager had seen previously.
The Customer Relationship Manager asked why the level of variation in the histogram appeared to contradict what he had seen during the tour. The Operations Manager pointed him toward a run chart of the same data. “Does this answer your question?” he asked. The run chart depicted exactly the same data but, when plotted as a run chart, revealed an improving trend in resolution time.

The Operations Manager went on to explain that since they had implemented the visual management board alongside regular team reviews, performance had improved and, according to the last week of data, average resolution time had actually improved to 13.5 days, 1.5 days quicker than before the visual management boards were implemented.

Within two months the process had stabilised at 13.3 days and continued to outperform the other business centre, setting the bar for continuous improvement across the organisation.

Consider using with

- Run chart
- Frequency distribution
- Fishbone diagram
- Five whys
- Brainstorming

Facilitation time

45 mins
Interpret Data

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