



USING PARETO CHARTS IN QUALITY CONTROL

A Pareto chart is a tool which helps to prioritise the issues or causes that affect a problem. The Pareto chart is based on the principle that there are usually few causes that contribute to the majority of problems. The Pareto chart is one of the most popular statistical tools used in quality control. It can help to identify the major sources of defects and thus better control the quality of production.

PROSPECTIVE USERS:

Pareto charts should ideally be prepared by a team of people representing different areas of the factory. This means that different perspectives and experiences come into play.

This practice can be applied to all kinds of factories.

PROBLEMS ADDRESSED

- Increasing or high frequency of product faults.
- Time used to repair the defective products.
- High levels of waste materials.
- Low productivity.

PROCESS

In order to prepare a Pareto chart, the line managers and QC staff must first collect information about product defects and sources of faults. The defect information is then displayed visually by mapping it onto Pareto charts. This allows the factory to see the priority causes of the defects, and thus identify solutions for them.

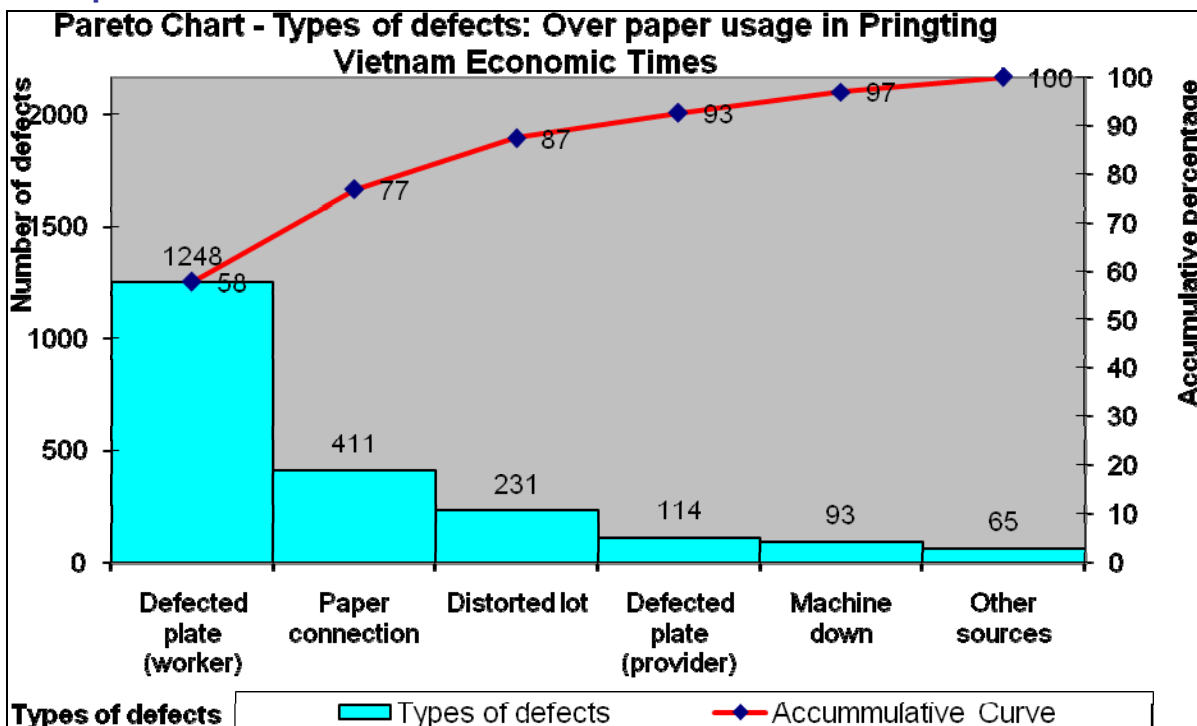
Steps in implementation

1. Use an inspection checklist (See FIP Good Practice Guide - *Quality Control Checklists*) to collect information about the frequency of defects by types or causes of defects, or assemble data that already exist.
2. Identify the main causes of the defects.
3. Decide what categories you will use to group items.
4. Decide what measurement is appropriate. Common measurements are frequency, quantity, cost and time.
5. Decide what period of time the chart will cover: one work cycle, one full day or one week?
6. Based on available data, calculate the frequencies of selected types or causes of defects.
7. Develop a table including 4 columns: types or causes of defects, amount or frequency, percentage of defects and accumulative amount or frequency. (See *Example 1*. below)
8. Put the types or causes of defects in the first column of the table by descending order, starting with the defects with the highest frequency.
9. Fill in the cells in the second column with the number of defects for each type or causes of defects (by descending order).
10. Calculate percentages of each type of defects by dividing number of defects of each type by total of defects for all types.
11. Calculate a cumulative percentage and fill in the last column. The cumulative percentage in the last cells should be 100 (%).
12. Calculate 80% of the accumulative percentage.
13. Draw the X and Y scale and draw the column representing the number of defects by descending order, starting with the defect with the highest frequency. (See *Example 2*. below)
14. Draw the third scale which is expanded from the last column in the chart. This is the percentage scale. The total value on the Y scale is equivalent to the 100% level of the percentage scale.
15. Draw the line representing the values of the cumulative percentage. The points on this line represent the cumulative percentage of each type of defects. The last point will be the same with 100% point on the percentage scale.
16. The next phase is concerned with identifying the 80% point in the accumulative percentage line. Draw a vertical line from this point to the X scale. Defects represented by the column on the left of this line are the important ones. This is where the 80/20 rule comes into play, as you will most often notice that about 80% of the defective products are caused by about 20% of the possible defect causes.
17. Pareto charts can be drawn on A0 or A1 sized paper. Computer aids, such as Excel based tools are a good alternative.
18. Share the findings of the Pareto chart with relevant staff members for discussion, feedback and agreement. Discuss the major causes of the defects presented by the Pareto chart with a working group, such as the QC division of the factory. Line managers may also be involved in this process. Analyze the important types or causes of defects. Are there any factors that can be eliminated? Factors with the highest frequency should be prioritised in order to be solved first.
19. Discuss ways to eliminate the major sources of defects.

Example of Pareto Chart 1.

Problem: Excess Paper Usage in Printing Vietnam Economic Times January-March 2007			
Types of defects (1)	Number of defects (2)	Percentage (3)	Cumulative Percentage (4)
Defected plate (worker)	1248	58	58
Paper connection	411	19	77
Distorted lot	231	11	87
Defected plate (provider)	114	5	93
Machine down	93	4	97
Other sources	65	3	100
Total	2162		

Example of Pareto Chart 2.



RESOURCES REQUIRED

- Line managers and quality controllers' involvement.
- A1 or A0 paper to draw the Pareto charts. Computer based tools with LCD projector support is a good alternative.
- Time and room for chart presentation and discussion.

CHALLENGES AND PITFALLS

- Staff may feel they have more work to do.
- Difficulty in collecting accurate, relevant defect information.

POSITIVE IMPACT

- Helps to identify the major sources of defects in a user friendly way in order to prevent them.
- Creates inputs for a quality improvement programme.
- Saves money by helping to eliminate major sources of defects.

INDICATORS FOR MONITORING

- Pareto charts created and used in quality data analysis.
- Major causes of defects identified using Pareto charts.

Further Information Available:

FIP References:
Module 2 - Quality

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