

Quality Improvement By Apply Seven Quality Control (7 QC) Tool in Process Industry

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Abstract— This project basically deals with improve quality by apply seven quality control tools technique sum of the prominent problems which are face in the small scale to top level scale of industries .the problem are related to the mass production industries. To decrease variance in quality. (7QC tools).The research was carried out in different areas that include power plant, process industry, government, and health and tourism services. The aim of the research was to show on practical examples that there is real possibility of application of 7QC tools. Conducted research has shown that there is possibility of systematic application of all of the 7QC tools in the frame of companies' overall quality management system. The paper is dedicated to present basic concepts on process improvement and to show how the basic quality tools can be used to solve problems and improve quality in modern organizations. An innovative approach on teaching these concepts and tools is discussed. Finally, a personal contribution in the area of quality tools is presented.

Key words: Basic Quality Tools, Quality management, Process Improvement, Manufacturing Services.

I. INTRODUCTION

Continuous quality improvement process assumes, and even demands that team of experts in field as well as company leadership actively use quality tools in their improvement activities and decision making process. Quality tools can be used in all phases of production process, from the beginning of product development up to product marketing and customer support. At the moment there are a significant number of quality assurance and quality management tools on disposal to quality experts and managers, so the selection of most appropriated one is not always an easy task. In the conducted research it is investigated possibilities of successful application of 7QC tools in several companies in power generating and process industry as well as government, tourism and health services.

The seven analyzed quality tools are:

- 1) Flow chart
- 2) Cause-and-Effect diagram
- 3) Check sheet
- 4) Pareto diagram
- 5) Histogram
- 6) Scatter plot
- 7) Control charts

In successful application of quality tools the implemented quality management system is advantage. The quality management principles are starting point for company's management striving for continuous efficiency

improvement in long period of time and customer satisfaction [1-4].

Quality management system is based on integrity of all production and support resources of certain company. It enables faultless process flow in meeting related contracts, standards and market quality requirements. Implementation of quality management system is always a part of a company development process, Fig.



Fig. 1: Development of quality management concept

Having the quality management system in place is prerequisite of its successful application on day to day basis. Management has to show commitment to development and improvement of quality management system. When in function the quality management system provides useful information obtained through different process analyses and audits [6].

If the companies focus is on customer, the company has to select the most efficient ways of data acquisition and market survey to confirm does the company's products or services meets customer demands and expectations. Collected information is invaluable in decision making process based on fact. Data collection and analysis is also of great importance for defining opportunities for further process and products quality improvement.

The model for systematic usage of quality tools for process monitoring, data acquisition and quality improvement is shown on fig.

II. THE SEVEN BASIC QUALITY TOOLS

Once the quality improvement process is understood, the addition of quality tools can make the process proceed in a systematic manner. Many quality tools are available for quality professionals for this purpose. Many organizations

use total quality management (TQM) tools to identify, analyze and assess qualitative and quantitative data that are relevant to their processes. These tools can be generally classified to three major categories namely the basic seven quality tools, the seven new tools for management and Planning and other tools.

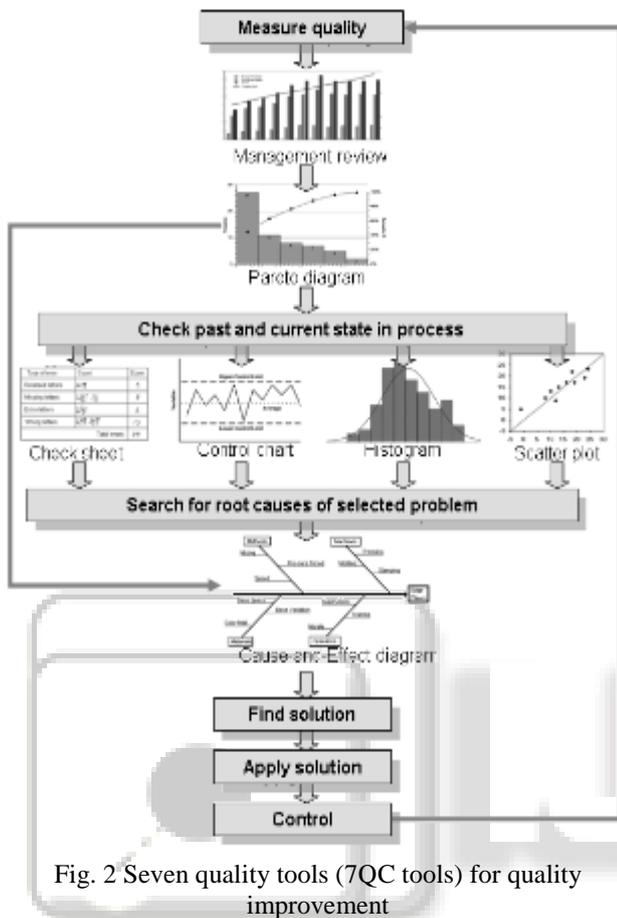


Fig. 2 Seven quality tools (7QC tools) for quality improvement

The seven basic quality tools are simple tools that can be used by any professional to ease the quality improvement process; these are: flowcharts, check sheets, Pareto diagram, cause and effect diagram, and histogram, scatter diagram, and control charts. These tools were originally developed by Kaoru Ishikawa, one of the pioneers of the Japanese quality movement. Ishikawa's original list did not include flowcharts; instead, it had graphs as one of the tools. These seven basic tools have been considered a part of Statistical Process Control (SPC), a quality management system that uses a set of tools to analyze, control, manage, and improve process quality. But not all seven tools are quantitative, let alone statistical. The flowchart is simply a visual description of a process. A cause-and-effect diagram is a brainstorming-based problem-solving procedure. Check sheets and Pareto diagrams are simply commonsense tools. Histograms scatter diagrams, and control charts are the only statistical tools in the list. Table 1 shows the seven tools and their applications within the PDCA cycle for process improvement.

Quality Pioneer Ishikawa believed that 95% of quality related problems in any organization can be solved with these basic tools. This statement has been proven by many organizations and researchers as it will be shown later.

The key to their success in problem-solving and process improvement initiatives are their simplicity, ease of use and their graphical nature. The tools were originally meant to make process analysis less complicated for the average factory worker in Japan, but now they constitute standard analytical tools to analyze quality problems and develop and identify optimum solutions and standardize them. They can easily be taught to any member of the organization. These tools have been widely used in manufacturing and services embracing process-improvement initiatives such as Total Quality Management (TQM) and Six Sigma.

These tools have been extensively described in textbook (Brassard and Ritter (1994), Grant and Leavenworth (1999), Juran (2000), Nancy (2004) and more recently Aichouni (2007) in his Arabic text book). A brief description of these tools is shown in this section

A. Flowchart

Is a graphical display of the process steps in proper sequence. A flowchart shows all process steps under analysis by the quality improvement team, identify critical process points for control, suggest areas for further improvement, and help explain and solve problems.

B. Check sheet

A structured, prepared form for collecting and analyzing data; a generic tool that can be adapted for a wide variety of purposes.

C. Pareto chart

Shows on a bar graph which factors are more significant.

D. Histogram

The most commonly used graph for showing frequency distributions, or how often each different value in a set of data occurs.

E. Cause-and-effect diagram (also called Ishikawa or fishbone chart)

Identifies many possible causes for an effect or problem and sorts ideas into useful categories.

F. Scatter diagram

Graphs pairs of numerical data, one variable on each axis, to look for a relationship between process variables.

G. Control charts

Graphs used to study how the process changes over time.

III. APPLICATION OF QUALITY TOOLS IN PROCESS INDUSTRY

Generally, business goal of every company is success in doing business. That success is shown through customer recognized quality of company's products and services. However, defining quality is largely under subjective customer opinion and criteria. To become more objective in the quality evaluation introduction of standards for quality management is necessity.

Quality management standard includes guidelines and recommendations for quality management system that encompass company organization structure, processes,

procedures and other necessary means for successful quality management.

In the paper the systematic approach to the quality improvement is shown on the simple example of a company in process industry. The company defined the principle of quality management as basic principle with goals of continuous improvement. Customer satisfaction is placed on the top of value scale, while data analysis is conducted permanently in order to recognize opportunities for process quality improvement. Selected company from process industry has certified quality management system in accordance with ISO 9000:2000. Company that manage its quality system in accordance with ISO 9000:2000 has to plan and implement process control, measurement, analysis and improvement in order to:

- 1) Demonstrate conformity of its products.
- 2) Achieve conformity of its quality management system,
- 3) Continuously improve efficiency of its quality management system.

Application of 7QC tools is analyzed in order to demonstrate possibility of systematic tools usage or, in other words, systematicness of quality tools. Although, the research has investigated possibilities and usefulness of application of all of 7QC tools, in the paper are shown application of only one of quality tools - histogram.

Example of systematic usage of quality tools is shown on procedure that includes communication with customer in process of dealing with customer claims. Immediately after a customer claim is received follows activities for removing causes of customer dissatisfaction that include corrective and preventive actions. The customer is, in written form, informed about all undertaken activities and appropriate claim report is prepared.

The number of customer claims is collected for three consecutive business years. On the end of each business year customer claims are systematically analyzed in order to identify type and amount of customer claims for year in consideration. Also, the undertaken corrective and preventive actions are analyzed to verify their effectiveness.

One of broadly used tools to visualized collected data is histogram. Other 7QC tools are used in order to evaluate is there more opportunities to improve process and meet customer demands.

IV. CONCLUSIONS

Research has been conducted in order to define role and importance of seven basic quality tools (7QC tools) within quality management system. In modern production processes it is necessary to implement integrated quality management system that involves quality management, responsible environmental performance and safe working environment. Systematic application of 7QC tools will enable successful quality improvement process. Quality tools has important place in data collecting, analyzing, visualizing and making sound base for data founded decision making. The paper stresses on the use of the seven basic quality tools to improve processes and to solve problems.

In modern production processes it is necessary to implement integrated quality management system. Integrated quality management system involves quality management, responsible environmental performance and safe working environment. In spite, during research, it is experienced certain discomfort towards quality tools. This state should be changed through continuous staff education and training.

REFERENCES

- [1] G. Paliska, Universality and systematicness of quality tools, M.Sc. thesis, Supervisor D. Pavletic, Faculty of Engineering, University of Rijeka, Croatia, 2007.
- [2] Z. Kondic, Quality and ISO 9000 – application, Tiva, Varazdin, Croatia, 2002 (in Croatian).
- [3] Bakija, Quality assurance according ISO 9000, Privredni Vjesnik, Zagreb, Croatia, 1991 (in Croatian).
- [4] N.N. Johanson, Application of quality management system, Seminar, Austrian association for quality assurance, Zagreb, Croatia, 2003 (in Croatian)
- [5] N.N. Johanson, TQM – improvement of business processes, Oskar - Centar za razvoj i kvalitetu, Zagreb, Croatia, 2002 (in Croatian).
- [6] N. Injac, Small encyclopaedia of quality, I-III parts, Oskar, Zagreb, Croatia, 2002 (in Croatian).
- [7] Grant, E. and Leavenworth, R. S., 'Statistical Quality Control', McGraw Hill, Boston. 1999
- [8] Gitlow et al., Tools and Methods for the Improvement of Quality, IRWIN. Homewood, IL, 1889.