

Impact of Quality Circle—a Case Study

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After second world war, most of the countries in the world had to face the problem of industrial development. Japan was worst hit and the industrial units in Japan were going from bad to worse and it was necessary for Japan to put their shattered economy back to the rails. To do so modern concept of quality control came to Japan after 1945, from USA, but it was only after 1955 that this system of management of quality control was actually implemented to the company from the bottom of the organization that could also share in the quality control function at the workshop level. Quality circle provides the employees at the bottom level to proceed towards the top level with opportunities to perform effectively and solving the daily problem of the unit. In this paper, the authors tried to study the impact of quality circle techniques through a case study dealing with causes of the material losses related to 4-Ms (man, machine, materials, methods), in a small production shop floor. The observed data are analyzed through Pareto diagram and 'Ishikawa diagram' and following results were obtained : Drastic reduction in materials wastage, average saving per year increased and financial losses were minimized, workers were motivated to keep and operate materials with care and prevent wastage, and good team relationship was built among the workman and management.

Keywords : Quality Management; Quality Circle; Weight Loss and Total Quality Management

INTRODUCTION

In older times, during the post world war the Indian workshop and industries were generally practicing older concept of system to manage the scientific techniques, as a result of following the older concepts unwisely a barrier of mistrust, individualism and non-involvement of different levels of manpower and management has been erected between the important sections of the organization. For example, during the post second world war era Japan was worst hit by the above mentioned crisis and the individual units in Japan were going from bad to worse and it was necessary for Japan to put their shattered economy back to rail. For that they had to wipe out their poor image of quality, with the help of some quality management experts from America, namely, Dr Deming, Dr Juran. At this point Dr Ishikawa of Mushashi Institute of Technology, Tokyo added a new dimension to this effect by involving task performer at the grass root level to work towards the quality improvement. He motivated the workmen to follow the quality control techniques in their shop floor by forming small groups and sought their help in solving the daily problem coming during the production of the job. After all the person who is actually doing the job know the job best. This was the basic guideline in forming the quality circle. Hence, by introducing this modern concept of quality control in any organization employees at the grassroots level have the opportunity to perform effectively and meshing well with the activities of other levels, *ie*, total involvement of the worker and the intellectuals and hence there was a tremendous change in the working environment between the management, and the workforce. Various studies have been conducted on the implementation of quality circles in different organization and the results were very encouraging. Study conducted by S K Dey, *et al* involving quality circles for a steady reduction in chemeical wastage proved to be very gainful to the

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industries related to the material wastage. Also study conducted by Reddy, *et al* on dimensional quality control of casting gives a result of good quality casting at minimum cost. Another study conducted by Shiva Gonde, *et al* which was different from other studies in the sense that he has implemented quality circle approach in technical education systems for solving work related problems and found that there were major dimensional change in decisions and actions, conventional bureaucratic approach to self empowering employees along with the responsibilities of managing the institutions.

METHODOLOGY

Formation of Quality Circle

The following basic elements constitute the structure of the quality circle :

- i) Top Management
- ii) Steering committee
- iii) Co-ordinator
- iv) Facilitator
- v) Leader
- vi) Members
- vii) Non-members

The success of the quality circles depends solely on the attitude of the top management and plays an important role to ensure the success of implementation of quality circles in the organization. Steering committee called middle management consists of chief executive heads of different divisions or a co-ordinator plays a positive role in quality circles activities for the success of the efforts. The meetings are conveyed at least once in one to two



Figure 1 Structure of quality circle

months interval. Co-ordinator also acts as facilitators is an individual responsible for coordinating and directing the quality circles activities within an organization and carries out such functions as would make the operations of quality circles smooth, effective and self-sustainable. Facilitator also acts as a catalyst, innovator, promoter and teacher and is nominated by the management. Leader of the quality circles is chosen by the members among themselves and they may decide to have a leader by rotation since the members are the basic elements of the structure of quality circle. Members of the quality circles are the small group of people from the same work area or doing similar type of work whereas non-members are those who are not members of the quality circle but may be involved in the circle recommendation.

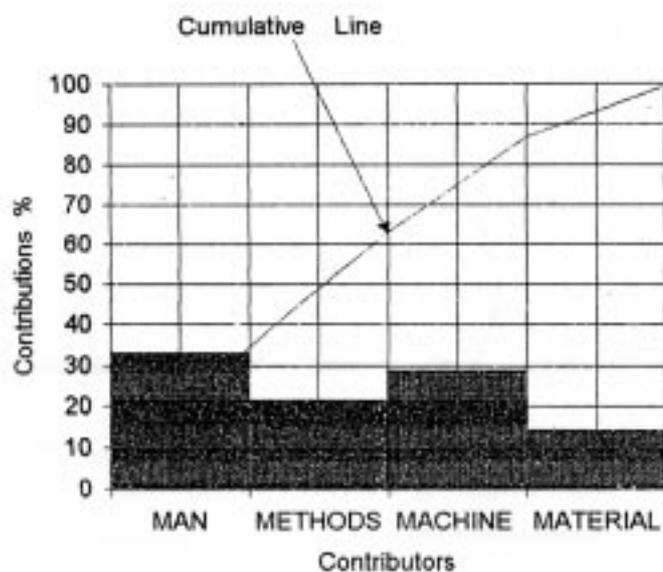


Figure 2 Pareto diagram

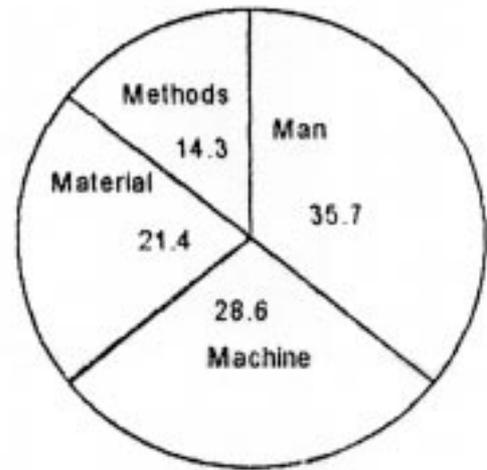


Figure 3 Pie chart (effectiveness of process variable on material wastages)

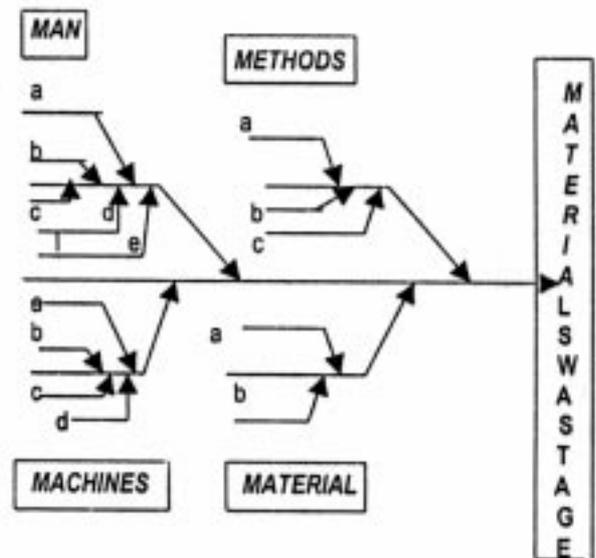


Figure 4 Ishikawa diagram (fishbone diagram)

Problem Solving Techniques

Quality circle commonly use the following basic techniques to identify and to analyze problems

- i) Team work (Brainstorming)
- ii) Collection of data
- iii) Pareto analysis
- iv) Ishikawa diagram (Fishbone diagram)
- v) Cumulative line diagram

PROBLEM FORMULATION

The present study was conducted by selecting a problem concerning with the material loss in workshop of University Polytechnic, AMU by forming a quality circle. The authors were involved as internal observer in the operation of quality circle working in workshop. The production involves manufacturing of

crankshaft, spindle and metallic numerals in the machine and fitting shop. The operation involves in producing the above products comprises of various methods of manufacturing such as facing, drilling, filling, cutting, shaping, threading etc. The operations of these quality circle as given below realize the impact of quality circle.

Case Study

- a) Name of the organization : Workshop, University Polytechnic, AMU Aligarh
- b) Number of circle : 01 (one)
- c) Section where the circle is operating : Machine and fitting shop
- d) Number of meetings held for last one year : 10 (ten)

The quality circle under consideration has a leader, a facilitator, a coordinator and four members. The object of the present quality circle is 'reduction of material wastage'. This problem was so chosen for solution because of following facts :

- a) Whether there was any reduction in material wastage.
- b) Whether there were any saving and financial losses that should be minimized.
- c) Whether it had any effect on the working of the workers and relationship between workman and management.

There were differences in the actual and expected material consumption. Table 1 gives the detail of material consumption for the year 1999 to 2000, before implementation of quality circle, and Table 2 shows the detail of material consumption for the year 2000 to 2001 after implementing quality circle. After various discussion and brain storming sessions following causes related to man, machine, material and methods were located.

Table 1 Details of material consumption for the year July 15, 1999 to March 31, 2000 (before implementing quality circle)

Items	Spfication	Material Consum-ption per year		Material Loss in machining, kg	Material loss in Rs
		Expected, kg	Actual, kg		
Mild Steel Rod	Length, mm : 50 Diameter, mm : 31 Carbon, % : 0.01 to 1 Harden cold rolled	210	105	105	1785.00
Cast Iron Block	Length, mm : 50 Width, mm : 50 Thickness, mm : 24 Carbon, % : 2-4	135	75	60	1920.00
Mild Steel Flat	Lenght, mm : 75 Width, mm : 48 Thickness, mm : 6	53	30	23	437.00
Total					4142.00

Table 2 Details of material consumption for the year July 15, 2000 to March 31, 2001 (after implementing quality circle)

Items	Spfication	Material Consum-ption per year		Material Loss in machining, kg	Material loss in Rs
		Expected, kg	Actual, kg		
Mild Steel Rod	Length, mm : 50 Diameter, mm : 31 Carbon, % : 0.01 to 1 Harden cold rolled	210	150	60	1020.00
Cast Iron Block	Length, mm : 50 Width, mm : 50 Thickness, mm : 24	135	105	30	960.00
Mild Steel Flat	Lenght, mm : 75 Width, mm : 48 Thickness, mm : 6	53	45	8.0	152.00
Total					2132.00

Causes Related to Man

- a) Lack of knowledge about the materials
- b) Proper instruction not given about the work
- c) The materials were cut more than the required amount
- d) Lack of knowledge about the operations
- e) Lack of knowledge about handling special tools

Causes Related to Machines

- a) Machines not operating at optimum condition
- b) Frictional wear of machine parts
- c) Problem arising due to misalignment of machine components
- d) Lack of implementation of new and automatic machines

Causes Related to Methods

- a) No proper inspection in the machine shop after the material has been issued from the store
- b) No proper care was taken in storing the materials
- c) Lack of knowledge of improving the existing method of production

Causes Related to Material

- a) No proper inspection of the material dimension before machining
- b) Materials obtained not having the required composition

Table 3 Saving in the material wastage for the year 2000-2001

Material Wastage before Implementing Quality Circle, Rs	Material Wastage after Implementing Quality Circle, Rs	Savings Amount Rs 1 year
4142	2132.	2010

DISCUSSION AND CONCLUSION

After implementation of quality circle, steady reduction in material wastage was observed. Considering the material wastage for the year 1999-2000 as a base year, calculated savings for the next one year 2000-2001 is obtained and shown in the Table 2. Besides this Table 3 gives the complete details of the monetary gain for the year 2000-2001 which shows a sufficient amount of saving.

Following observation were achieved after implementation of quality circle.

- i) Improvement of internal personal relationship
- ii) Self-confidence was developed in solving more complex problem related to production.
- iii) A good teamwork was achieved among the workman
- iv) Material wastage was minimized as a result heavy monetary gain was obtained.

Table 4 shows a percentage of contribution of various factors that led to material loss in the given order. These four factors were chosen as the most effective factor in analyzing the problem. The various reason or causes of each factor were determined and shown in Ishikawa diagram (Fishbone diagram). The causes and effect

Table 4 Percentage of contribution of various factors towards the loss

Reason / Cause	Percentage, %	Cumulative, %
Man	35.7	35.7
Machine	28.6	64.3
Methods	21.4	85.7
Materials	14.3	100.0

were obtained by calling various quality circle meetings (ten) through brainstorming session and discussion. And hence these factors led to the result of the present study in the following order

- : Man
- Machine
- Method
- Material

Further this quality circle approach for quality improvement in University Polytechnic workshop may bring new dimension, shifting dependence for decisions and actions, conventional bureaucratic approach towards existing system. Empowering employees exhibit considerably owing the responsibility of managing the organization. This change revealed that quest for quality service is in the hand of all employees. This success of quality circle in the workshop and small enterprises. This quality approach may be required to be spread in all polytechnic workshop and small-scale enterprise existing in the country. The sustenance of success will lead to total quality improvement emerging as a centre of excellence of its own in any small enterprise in India.

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