

# **CHAPTER – I**

## **INTRODUCTION**

### **1.1 Introduction**

Today managing an organization is very complex job, due to change in technology, social structure, employee's norms, leaves & market competition etc. It is the reason that the theory of management is being changed time to time.

The modern method of management that recently practiced in many developed & developing countries like Nepal is called Total Quality Management (TQM). It is a kind of management where the authority & responsibilities are decentralized towards the lower level of employees. Under TQM different tools & techniques are used for better quality & high productivity through satisfying the customer's needs & wants. Some of the most important tools used in TQM are as follows:-

- ) Quality Control Circles
- ) Contentious Improvement
- ) Employees Empowerment
- ) Bench Marking
- ) 5W 1H Technique
- ) Pareto Analysis Chart
- ) Control Chart etc.

The Quality Circle (QC) is a participative philosophy woven around Quality Control & Problem Solving technique at the bottom level. It is well authorized groups within the organization which solves all the problems at the bottom level. Each group contains Four to Ten employees with same workplace. They meet regularly generally once a week & discuss about the problems that emerged in their regular work life. Then they will try to solve those problems

themselves. In this process there are no any roles of top management to solve that problem; but the moral, supportive & motivational role of top management is too much necessary to run that types of QCs. Because those QCs are totally volunteers in nature that doesn't take any types of extra benefits form the organization.

The importance of QCs is increasing day to day in our business life. It helps us to do continuous improvement in our regular work life. It is totally participative & self manage team-work. Thus it helps the employees to increase interrelationship among them. It also helps to increase co-operation between labor & management too. The QC members exchange their creative ideas among the groups that lead to their mutual development. It results the synergetic effect on work that they have to do. Thus the team spirit is develops due to participation of workers in improving Product/Service quality. Ultimately the productivity increases due to increase in quality & 'Zero Defect' strategy.

### **1.1.1 About Nepali Paper Products "NPP"**

Nepali Paper Products P. Ltd. (NPP) is a hand made Paper Company. It makes hand made paper called "Nepali Paper" & its related products. This industry located in the Sitapaila, Kathmandu, Nepal. The company is a private limited company, established in 1991 as manufacturer & exporter. It's paid up capital is NC Rs. 20,000,000.00. It's main products are Notebook, Stationary & Dyed Sheet Paper whose production capacity is 4,00,000 Pecs, 3,00,000 Pecs & 5,00,000 Sheets respectively (in quantity). An average 175 Employees are working here & its annual revenue is U.S.\$12,00,000 ( When it will utilize their full capacity).It is a forestry based industry because main raw material (Lokta) used in this industry comes from the forest. But all its production is exported for many countries.

This company is using the TQM approach of management, under which different Quality Control Circles (QCCs) are running in this organization for better quality & high productivity. This company is also ISO 9001:2000 & 14001:2000 Certified.

This company has received many awards in its 17 years successful working period. The awards it received are as follows:-

- a. Nepali Paper Products P. Ltd has received a award for significant contribution to the business world, for high standing & professionalism demonstrated by prestigious performance, BID Business Initiative Directions presents its special reorganization award "International Gold Star for Quality Geneva 2000".
- b. Trade Leaders Club, Spain Madrid has awarded to this company "International Award for the Best Trade Name New millennium Award 2001".
- c. Since 1995/1996, receiving top exporter award from handicraft industries association of Nepal continuously till to-date.

### **1.1.2 Types of Raw Materials used for Production**

Hand made paper is made from the inner bark of a wild under storey shrubs locally known as "Lokta" or Daphne Cannabina or Daphne Papyracea which is found at altitude of 6500 feet to 9500 feet. These plants are observed growing gregariously in the under storey of both coniferous and brosd leafed forests. At favourable sites it attains a height of 10 to 15 feet with basal diameter ranging from 2 to 3 inches. The leaves are alternate green in color, 2 to 4 inches long and 0.5 to 1 inch wide. The flowers are white with a sweet smelling scent. The inner fibrous bark of this plant is the raw material used for the making of Nepali hand made paper. The "Lokta" or Daphne Papyracea has characteristics of growing after cutting from above 6 inches from the ground and becomes again matured to cut after 6 to 8 years. Thus it preserves the fragile forest ecology of Nepal. The long fibrous in hand made paper is prized for its rough attractive texture its durability, strength and its resistance to insects.

## **1.2 Background of the Study**

Nepal is a land-locked developing country. Its per capita income is very low. The national economy is damaged due to unstable political situation & last 12 years freedom fight. At present two big neighbors countries like India & China's economic growth rate is near to 10% where as our economic growth rate is near to 4.3%. On the other hand our Inflation rate is near to 8%.

In this situation our country & Investors are not able to invest for very big project or Industry. But we are able to invest in small & medium enterprises; basically agro & forestry based industries are suitable for our country. This is the reason that need of Small & Medium Enterprises (SMEs) is essential for our country.

## **1.3 Objective of the Study**

Objective means the desired output. The main goal of QC analysis is to show the relationship between individual & team-work; Cultural effect on work; team work & productivity; profit due to team work; QC & creativity etc. And recommend appropriate suggestions to the management.

The main objectives of the study are as follows:-

- a. Types & levels of the problems that emerged in Small & Medium Enterprises (SMEs).
- b. Problems for Implementing & running the QCCs.
- c. Links between QCCs & Productivity.
- d. Needs for QCC in SMEs.
- e. Its wastage & their effect on environment.
- f. Effectiveness

## **1.4 Significance of the Study**

Nepalese economy is declining towards the recession day to day. No any manufacturing organization is running in its optimum capacity & its balance

track. In this situation TQM & its importance becomes much more compulsory for better productivity to earn high profit. This is the reason the need & scope of this study is more important.

### **1.5 Research Questions**

In this study all levels of the staff directly related to the production & management will be consulted to collect the primary data. Also the researcher checks the data's related to the record keeping process, like QC meeting records; Implementation of different tools for problem solving; use of productivity increasing approach etc.

For this many questions will be asked from the different levels of employees. Some of the model questions are as follows:-

- a. How many QCs are available in the organization?
- b. How many times they attends meeting in a month?
- c. Is there applied the seven tools of TQM?
- d. What are the visible benefits of QC applied in the organization?
- e. Is the QCs are able to increase the productivity in this organization?

### **1.6 Limitation of the Study**

This research is fundamentally based on the direct observation; Interview; Record Books & data published by the organization (Nepali Paper Products P. Ltd.). So following are the some major limitations of the study:-

- a. The study will try to cover the data or records of last five years.
- b. The research is based on both primary & secondary data & the researcher will analyze it.
- c. The accuracy of the research will be depends upon the true response of the organizations employees.
- d. Time & availability of resources are the main limitations of the study.
- e. This study is only concern with the fulfilling in partial requirement in Masters of Business Studies (MBS).

## **1.7 Organization of the Study**

This research work has been divided into five chapters. These are as follows:-

### **Chapter - I: Introduction**

It entitles "Introduction Chapter" which includes general background of the study, brief introduction of the companies; statement of the problems; objectives of the study; need/scope or significance of the study; limitation of the study & organization of the study.

### **Chapter - II: Review of Literature**

This chapter is concerned with review of literature; reading materials in this chapter are conceptual review & review of preview related studies.

### **Chapter -III: Research Methodology**

This chapter consists of "Research Methodology" adopted for the study & includes research design, data collection procedures & data analysis tools.

### **Chapter -IV: Data Presentation and Analysis**

This chapter comprises the presentation & analysis of the data.

### **Chapter -V: Summary, Conclusion and Recommendations**

This chapter is concerned with the output of the study in the form of summary, conclusion & recommendation.

At the end of the study list of vita are included.

## **CHAPTER - II**

### **REVIEW OF LITERATURE**

#### **2.1 Introduction**

This thesis is mainly based on the field of Quality Control Circle (QCC), mainly Total Quality management. And QCC being one of the vital parts of Total Quality management is no doubt of great importance for a manufacturing company to assure the quality of their product well in quality control, this thesis has been started. So to demonstrate how the overall quality and productivity management is affected by Quality Control Circles, all the possible means has been used.

This is the thesis based on effect of advertising and promotional efforts on market share of products. So related publication regarding advertising articles, different books, encyclopedia, as well as pervious studies relating to the same subject has been consulted to make it more reliable. Besides books related to marketing and current market situation too has analyzed. Thought advertising is not that common field, still people are writing on the subject since from last two decades. So earlier reports too have been have reviewed and new horizon of Advertising/promotion has been made more clear.

While reviewing different books and literature, some of the basis things and knowledge about Advertising/promotion seemed to be mentionable in the thesis context.

Similarly, all related pervious studies (found so far) has been collected and analyzed so as to find out how advertising is making its field broader and how is it working more. So related pervious studies has highlighted here for everyone's convenience.

## **2.2 Conceptual Review**

### **2.2.1 Introduction to Total Quality Management (TQM)**

Dr. Kaoru Ishikawa is one of a best TQM Guru of the world. He was born in Tokyo in 1915 with an Engineering degree in applied chemistry. Dr. Ishikawa's first job was as a naval technical officer (1939-1941) then moves on to work at the Nissan liquid fuel company until 1947. Dr. Ishikawa was also a Japanese University associated professor of Tokyo. Then he undertook the presidency of the Musashi Institute of Technology in 1987.

In 1949, he joined the Union of Japanese Scientist & Engineers (JUSE) quality control research group. After the 2<sup>nd</sup> world war was finished, in 1950, Dr. Edward Deming came to Japan & took seminar for TQM among the top levels managers in Japan. After one year, Dr. Joseph M. Juran also came in Japan & expended his ideas & translated integrated & expended the management concepts of Dr. Deming & Dr. Juran into Japanese systems & languages.

After becoming a full professor in the faculty of Engineering at University of Tokyo (in 1960), he introduced the concept of Quality Circle (in 1962) in conjunction with JUSE. His QC would soon became very popular & form an important link in the companies' total quality management system. Then Dr. Ishikawa would write two books on Quality Circles. One book was "Circle Koyo" & another was "How to operate circles activities".

Among his efforts to promote quality where the annual quality control conference for Top Management (1963) & several books on Quality Control, the Guide to Quality Control was translated into English. He was the chairman of the editorial was involved in international standardization activities. In diagram which is used to determine the root caused. He got an innovation on quality circle. He published many books & articles for quality control circles & total quality management.



### **2.2.1.1 What is Quality Circles?**

A Quality Circle is a volunteer group composed of workers or even a group of students now-a-days, who meet together management with their ideas. Typical topics are improving safety, improving product design, & improvement in manufacturing process. This can not only improve the performance of any organization, but also motivate& enrich the work life of the employees. Quality Circles have the advantages of continuity, the circles remains intact from project to project.

The Quality Circle concept took root & grew rapidly in Japan during the 1960s & American industry took a while to recognize the potential, but began to implement the concept in 1970s.

Dr. Ishikawa recognized the significant of shifting the responsibility for problem identification & problem solving to these on the factory floor. People on the factory floor are closest to the problems that interfere with delivering a quality product & meeting production schedules. It is recognized that having personnel outside the immediate work center identify & solve the problem entailed another serious detractor & that is resistance to change. Dr. Ishikawa reasoned that by including the personnel closest to the problem. Identification & solving process, two benefits would simultaneously be realized.

1. People closest to the problem would be part of team developing solution.
2. People closest to the problem would be more receptive to any required changes.

Dr. Ishikawa felt that the quality circle concept offered an excellent vehicle for pushing problem identification solution development & corrective action implementation to the shop floor problem-solving technologies. He even

develops a Japanese Quality assurance magazine, QC for foremen in 1962 to further push the quality circle concept.

Generally quality circle group comprises to 4 to 10 peoples who work together in same work place. The members improvement of their work conditions. Workplace doesn't mean only the shop floor of a company but can be an office, a department, or any unit of organization or society level. The members of the group meet regularly once a week on a specific day, time & specific venue. They identify problems concerning their work, analyze & solve the problems, systematically. Problems are those that keep recurring & are directly affecting the performance of the people concerned. Once the problem is identified, appropriate plans are formulated to solve the problems. These plans if necessary are presented to management & implement them offer receiving the approval from management. After implementation the results are monitored & ensured that problems are no reoccurring or are eliminated. If the problems recur, the plan should be revised to ensure that the problem is solved permanently. Once the problem is permanently eliminated, select another major problem to tackle.

A systematic problem solving procedures for sustainable solutions to problems in the work place are developed. Circle figures at other people circles may seek help or advice from the relevant people of the other department & invite skill & knowledge for problems solving & continual improvement of the quality.

#### **2.2.1.2 Basis of Quality Circle**

Quality Circles functions on certain promises which must be recognized & build upon to draw the full benefits out them.

- ) Every individual has unlimited capacity to think & work.
- ) People inside the work place know about the work better them those outside.
- ) A group of people can contribute more then one person.
- ) Always win/win situation as against win/loss situation.

- ) Facts & figures are more specific than vague guesses.
- ) Continuous small improvement adds up a significant improvement.
- ) Circle activities carried out as a company-wide quality campaign.
- ) Problems are easily solved if the methods of solving are simple.

### **2.2.1.3 Benefits of Quality Circle**

There are too many benefits of Quality Circles. Some of the important benefits are as follows:-

- ) The training on problem solving procedures and involvement of all members in practical application through Quality Circles provides opportunities of self-development to all the individual members of the circle.
- ) Exchange of creative ideas among the group leads to their mutual development. This brings about group power and promotes group dynamism resulting in synergy. Team spirit is developed.
- ) Positive interactions and exchange of creative ideas provide opportunities to improve individual level of skill and knowledge.
- ) Group dynamism promotes better inter-personal relations among the members.
- ) As problems get solved one after another, working becomes easier and simpler. Improved human relations and creation of positive work environment bring pleasure in jobs.
- ) Members assume responsibility in identification of problems and analysis. This meaningful and interesting work provides a new challenge to them. Presentations before management provide a dramatic recognition of their efforts. All these provide a high level of self-respect and motivation to the employees.
- ) Due to participations of the workers in providing products/services quality, products/services are manufactured / delivered exactly conforming to specifications. Productivity increases as quality improves.

) Ultimately, every stakeholder in the organization – the owner, the employees and the customer, share the benefits.

## **2.2.2 The History of Quality Control Circles (QCCs) in Japan**

The history of the QCCs is as follows:-

### **2.2.2.1 The Birth & Diffusion of QC Circles**

According to the QC Circle Koryo (Principles of QC Circles, QC Circles Headquarters, 1970), a QC Circles is a small group in the same workshop that voluntarily & continuously undertakes quality control activities, which includes the control and improvement of the workplace. Activity is linked with company-wide quality control and the promotion of self and mutual development. According to the same compendium, the basic philosophy of QC Circles is to:- (1) contribute to the development and improvement of the organizational system, (2) humanize the work place by establishing a cheerful and challenging atmosphere and (3) utilize to the almost human ability and its infinite potentials.

How did such a unique activity start and grow? Circumstances that led to the birth of QC Circles and its development is analyzed below.

#### **) The birth of QC Circles**

Training on statistical quality control for foremen and employees was necessary for the permeation of quality control in the organizational base. JUSE, in aiming at the diffusion of statistical quality control among foremen, initiated lectures on the basics of quality control in the Japan Shortwave Radio in 1956 and the NHK Educational TV in 1957. Response to the latter exceeded expectations, demonstrated by sales of more than 110,000 texts (Ishikawa, 1981). In 1960, JUSE published the Quality Control Texts A and B for Foremen, and in 1961, a special issue for foremen of the journal "Quality control", a technical journal for engineers, was circulated. In a symposium at

about this time, foremen strongly clamored for publication on quality control that can be applied in the workshop. To meet this demand, the magazine "Genba-to-QC" (The Workshop and QC), later renamed "QC for the Foremen", was inaugurated in 1962.

Under such circumstances, the conception of establishing QC Circles as study groups composed of foremen materialized. Circle members would read "QC for the Foremen" and apply the principles of the Quality Control in their own work by solving actual problems in the workshop. Ishikawa called for the formation of QC Circles in the inaugural issue of the magazine. In retrospect, he described the reason for circle establishment as follows (Ishikawa, 1981: 30-31):

"First, there were apprehensions as to whether the magazine would be read, even with efforts to establish it since foremen do not have the habit of studying. If it cannot be expected that they study individually, why not establish study groups for this magazine where by they could read by turns .....second , QC is not useful whatsoever if it is merely studied in their own workshops, utilize the simple statistical techniques studied, and deal with problem solving in their own workshop. For this purpose, it would be preferable if groups are formed. "

QC Circles originally started as "voluntary" study groups for foremen. Soon after, rank and file employees were included in the activity. In 1962, the QC Circle Headquarters was established in JUSE to promote the diffusion of QC Circles. In May of the same year, the Matsuyama Carrier Equipment Circles of the Nippon Telegraph and Telephone Corporation registered with the QC Circle Headquarters to become the first QC Circle in Japan. In November, 1962, the Annual QC Conference for Foremen was held regionally, and up to 1985, this conference has been conducted more than 1000 times. In 1964, Regional Chapters were established as satellites to the QC Circle headquarters, which gave rise to a nation wide in fractures committed to the diffusion of QC

Circles. Often, companies that served as coordinators in these regional chapters provided guidance to companies eager to learn the ropes of introducing QC Circles. Similar to the guidance provided by Senpai companies in striving for the Deming Prize, a teaching chain emerged where by companies shared experiences on circle introduction through regional chapters.

### J The Growth of QC Circles

Based on the statistical sources, the growth of QC Circles is analyzed below. Table 1-1 is the result of the author's compilation of the increase of QC Circles annually from 1965 to 1984 based on JUSE's data on the number of registered QC Circle.

**Table 2.1**  
**The Annual Increase of QC Circles in Japan**

Fiscal Year	Net Increase	Comments
1965	2,379	4,930 circles in 1965
1966	4,342	
1967	5,765	
1968	8,557	
1969	7,526	
1970	8,867	
1971	9,249	
1972	5,984	First Oil Crisis
1973	7,878	
1974	6,998	
1975	5,920	
1976	7,794	
1977	8,598	
1978	8,857	Second Oil Crisis
1979	11,610	
1980	13,491	
1981	19,361	
1982	25,847	
1983	26,991	
1984	22,818	223,762 circles in 1985

*Source: (JUSE, 1985)*

Two observations can be made from the table. First, from the table. First from a mere 4930 circle in 1965, circle increased approximately 40 times after two decades, equivalent to 223,762 circles in 1985. Of course, there is no assurance that all of these circles were active. Yet, the data shows the unprecedented growth of QC circles. Mover over, if the number of unregistered circles were to be included in the table, the number would increase by 8-10 times, according to the estimate of Ishikawa (see Oba, 1969). Second, despite the occurrence of the two oil crises, the growth of circles was not adversely affected. From 1965 to 1972, the period of economic growth, circles were established at an average of 6,669 circles annually. From 1973-1979, the oil crises period, an average of 8,236 circles annually were established, and from 1980-1984, an annual average of 21,701 circles was noted. The growth of QC circles, not in only during the high growth period, but also in the low growth period, shows that QC circles were highly useful for companies. During the high growth period, circles served as a means of attaining higher productivity. During the slack growth period, circles were effective for cost reduction. This is consistent with the observation made by Nita [1978].

**Table 2.2**

**Implementation Rates of QC Circles According to Company Scale**

Number of Employees	Rate of Implementation
More than 5,000	83.4%
More than 1,000	72.0%
Less than 1,000	66.7%

*(Source: - Denkirouren, 1983:19)*

Table 1.2 shows the implementation rate of QC circles based on company scale. The data, though limited to the electrical industry, shows that bigger the company, the higher the rate of implementation of QC circles. The maintenance of QC circles calls for the establishment of a support system and the sustenance of a training staff, both of which necessitated considerable

outlay. Besides, the availability of human resource potential is a must. Big corporation with adequate resource are more in a position to satisfy these requirements.

Table 1.3 shows the diffusion of QC circles across departments as a component of company-wide quality control. Based on a 2-year comparison, the data demonstrates clearly that circles expanded from the traditional area of production, maintenance and equipment, into design, research and development, management, sales and service.

**Table 2.3**

**Implementations on Rate of QC Circles for 1982 and 1983**

Department	1982	1983
Production	97.3%	92.2%
Maintenance/ Facilities	70.5	76.7
Material/ Warehouse	67.0	76.1
Design/Engineering/Management/Research	57.3	74.0
General Administration	60.2	64.2
Sales/ Service	19.5	44.3

*(Source: - JUSE, 1983a: 7)*

In addition, the author investigated the industry represented by 124 enterprises affiliated with the QC circles regional chapters. Ten percent of the companies belong to the services industry, like finance and retail. In 1985, the first Nationwide Quality Control Conference for Service Industry was held separately from the Annual Conference for Foremen, intended for the manufacturing sector. These indicate that circles are no longer confined to manufacturing, where circles originated, but have spread into the tertiary industry.



## **2.3 The Process of Making QCCs**

The general organization for effective implementation of QCC activities in any establishment consists of QC Steering Committee, QC Facilitator, QC Leader and QC Members.

### **2.3.1 QC Steering Committee**

- i. Formation of a Steering Committee is the foremost activity when commencing on QCC activities. The Steering Committee plays a key role in implementing QC in an organization. It is necessary to give continuous guidance and encouragement to the circles. Its main objective is to provide proper directions and opportunities for self and mutual development of the members. This lead to the enhancement of productivity and quality as circle members engage in practical application of problem solving tools and techniques.
- ii. It is very important that the chief of the organization assume the role of the chairman of the committee which may consist of 7 to 10 members generally represented by all different department heads. However, the size of the committee may be smaller depending on the size of the organization.
- iii. The major duties of the steering committee are as follows:
  - ) Circle activities
  - ) Formulating appropriate strategies and polices to provide Creating congenial environment for the promotion of proper any directions to the Circle activities
  - ) Evaluating Circle activities and progress and resolving any problems impending the smooth functioning of the Circles
  - ) Evaluating proposals plan for improvement put forward by Circle and approving them for implementation.
  - ) Recognizing the performance of the Circles

### **2.3.2 QC Facilitator**

- i. A facilitator plays the most important role in maintaining the progress of the Circles. The steering Committee selects someone from the employees who has appropriate qualities of tactfulness, leadership, skill and knowledge and adequately motivated to assume the role of a facilitator. The facilitator is given necessary training on QCC and QCC activities. There may be more than one facilitator depending on the number of circles in the organization.
- ii. As the promoter of QCC, a facilitator assumes numerous roles such – as a coach or trainer, a coordinator, a statistician, a catalyst, a motivator, and an individual who is hopeful even in extreme conditions.
- iii. The major duties of a facilitator are as follows:-
  - ) Maintaining liaison between the QCC and the steering Committee.
  - ) Identifying strengths and weaknesses of the QCC
  - ) Monitoring the progress and making efforts to overcome impediments to the QCC activities.

### **2.3.3 QC Leader (Team Leader)**

- i. The success of a QCC depends solely upon the QC leader, and the team leader may have a deputy. It is important for the team leader to see that every member can take charge of his role and give a full display of his abilities during Circle meetings.
- ii. The major duties of a Circle leader are as follows:
  - ) Maintaining an organized team
  - ) Leading Circle members in the right direction
  - ) Establishing a healthy inter-personal relationship and good among the members.
  - ) Initiating and summarizing discussion in QCC meetings.
  - ) Establishing cording between the Circle and different departments in the organization.

- ) Preparing and submitting reports on result of Circle activities to the managements

#### **2.3.4 QC Members**

- i. Any employee, worker, supervisor, officer or manager of an organization can be a member of the QCC. Generally, a QCC consists of a group of people working in the same workplace whether it is a shop floor, a department, a section, a unit, a room or even a machine. The members voluntarily join the circle to be involved in solving problems of their workplace through mutual discussions and create an environment that gives pleasure to work.
  
- ii. The major duties of Circle members are as follows:
  - ) Identifying major problems occurring in the workplace and selecting an appropriate theme
  - ) Devising a plan to solve the problem and presenting before the QC steering committee
  - ) Implementing the plan approved by the steering committee.
  - ) Continuous monitoring of the results of the plan implementation.
  - ) Ensuring that the particular problem does not repeat again.
  
- iii. To carry out the above duties, the members should
  - ) Establish the habit of being present at the Circle meetings at the specified time and actively participate in the discussions
  - ) Contribute positively in the brainstorming exercise.
  - ) Adopt the systematic procedures for solving problems permanently
  - ) Apply simple problem solving tools and tackle problems with facts and figures.
  - ) Develop the habit of working in groups.

- ) Respects the rights of expression of other members, their ideas and thoughts.
- ) Abandon the attitude that there is only one right solution to a problem
- ) Adopt the golden rule "no criticism ".
- ) Evaluate all dimensions of an issue before arriving at a conclusion.
- ) Accept that there is always better way of doing things.

## **2.4 Seven QCC Tools**

"QC Circles need a well-defined process for collecting facts and data that helps them to understand situations in real time and develop countermeasures (Implemented through the following PDCA management cycle or the QC Story) to address problems and prevent them from recurring. QC tools and QCC techniques, weapons to help QC Circles make decisions that allow them to properly follow the QC Story, are not only powerful but also imperative. In other words, it is impossible for QCC members to follow the QC Story without proper QC tools. Here following are the seven QC tools and QCC Techniques that QC Circles all over the world use in their problem solving.

The seven QC tools are used to collect, summarize, and analyze data (quantitative and qualitative), where as basic techniques such as Brainstorming, the Why-Why approach, affinity diagrams, 5S, 3Mu, 5W1H and 4M1E are used to assist members to think creatively.

The seven QC Tools & QCC techniques are the most basic ones. As the Circle matures and the members are able to handle more complex QC tools and techniques, these should be made available to them by the QC Circle Office.

The Seven tools are usually considered to be

1. Stratification
2. Pareto Diagrams
3. Cause & Effect Diagrams (Ishikawa Diagrams)

4. Graphs
5. Check sheets
6. Histograms
7. Scatter Diagrams
8. Control Charts

Although stratification is sometimes replaced as a tool by control charts, beginners are recommended to follow the seven QC tools listed above.

### **2.4.1 Stratification**

The objective of Stratification is to grasp a problem or to analyze its causes by looking at possible and understandable factors and items. Collected data of a single population is divided – by time, workforce, machinery, working methods, raw materials, and so on - into a number of stratum (or layers) to find some latent characteristics among the data – be they same or similar. For example, after collecting data on photocopy mistakes, we can find some factors or peculiarities that can be stratified in terms of operator, photocopy machine, sheet size, time, date, or copy operation method.

#### **How to Stratify Data**

- Step 1: Clarify the objectives of stratifying data.
- Step 2: Clarify the items to be stratified within the problem.
- Step 3: Determine the method of collecting data.
- Step 4: Check and compare the stratified data items.
- Step 5: Find causes by finding big differences among data items.

If a big difference is not found, keep going back to step 2 to add some other stratifying items until obvious peculiarities among the data are discovered.

#### **Typical Categories of Stratification**

- ) By time: Year, month, week, day, hour, night, afternoon, morning, period, etc.

- ) By workforce: division, section, dayshift, nightshift, group, age, experience, etc
- ) By machinery: line, equipment, machine number, model, structure, jigs, dies, etc.
- ) By working method: working procedure, manual, speed, etc.
- ) By raw material: place of origin, supplier, lot, charge, etc.
- ) By product: country, unit, order, manufacturer, service provider, etc.
- ) By environment: temperature, humidity, weather, etc.

### **2.4.2 Pareto Diagrams**

A Pareto diagram is a form of bar chart with the items arranged in descending order so that you can identify the highest contributing factors to a problem. A Pareto diagram shows which defective items should tackled first. This types of diagram was given its name by Dr. Josep M. Juran because of its likeness to the 19<sup>th</sup> century work of Vilfrido Pareto on uneven economic distribution- work postulating that 80 percent of the wealth of a nation is owned by 20 percent of its population. Applying the principle to the production of a typical company, Juran referred to the 20 percent of workers who produced 80 percent of its output as the vital few and the remember as the trivial many. By depicting events or facts in order of decreasing frequency (or decreasing cost, decreasing failure rate, etc.) a Pareto diagram can easily separate the vital few from the trivial many. They are also used to compare conditions over time, to see how both the distributions and the total effects have changed after corrective action has been taken. This type of diagram is one of the most common statistical tools used by QC Circles.

#### **How to Construct Pareto Diagrams**

- Step 1: Clarify the objectives of constructing a Pareto diagram.
- Step 2: Clarify the stratified items of collected data within the problem.
- Step 3: Design a data tally sheet listing the items with their totals.
- Step 4: Fill out the tally sheet and calculate the totals.

- Step 5: Make a Pareto diagram data sheet listing the items, their individual totals, cumulative totals, percentage of overall totals, and cumulative percentage.
- Step 6: Arrange the items in terms of number of occurrences and fill out the data sheet. The item "others" should be on the last line, no matter how large it is. This is because it is a collection of items for which the largest number of occurrence of any one item is smaller than that for the smallest of the individually listed items.
- Step 7: Construct a Pareto diagram from the Pareto diagram data sheet.
1. Draw two vertical axes, marking the left-hand vertical axis with a scale from 0 to the overall total and the right-hand with a scale from 0 percent to 100 percent.
  2. Draw a horizontal axis. Then construct a bar diagram, dividing the horizontal axis according to the number of items.
  3. Draw the cumulative curve (Pareto curve).
- Step 8: Add necessary information regarding the diagram: title, significant quantities, units, sampling period, subject and place of data collected, total number of data, etc.

### **2.4.3 Cause and Effect Diagrams (Ishikawa Diagrams)**

This diagram composed of lines and symbols is designed to represent the relationship between effects and their causes. It is sometimes called an Ishikawa diagram, after Dr. Kaoru Ishikawa who is considered the father of QC Circles. Others call it a fishbone diagram due to its resemblance to a fish skeleton. It is a very effective tool for analyzing the causes of a problem, even household problems like high consumption of electricity.

How to construct cause & effect diagrams:

- Step 1: Write the problem on the right side and box it. Draw a main arrow from left to right, with the head of the arrow pointing to the problem.

- Step 2: Identify all of the main categories of causes of the problem, for example, man, method, materials, machine and environment. Use branch arrows to connect the categories to the main arrow.
- Step 3: Using twig arrows, connect the individual main causes identified in step 2 to their respective branch arrows.
- Step 4: Identify the detailed causes of each main cause and connect them to the twig arrows, using even smaller twig arrows.

#### **2.4.4 Graphs**

A graph is a tool used to present an area of interest in visual form. There are various types of graphs, and the most common are bar graphs, line graphs, and pie charts. People involved in QCC activities are recommended first to decide on the data to be collected and the period in which it will be collected, regardless of the type of graph they will use.

#### **Ten Merits of Graphs**

1. Numbers can be visualized.
2. Readers get to sense the whole picture.
3. They require few words.
4. They are interesting to look at.
5. Contents can easily be understood.
6. They are objective.
7. They are easy to make.
8. Comparisons are easy to display.
9. They are a universal form of language.
10. They enhance the image of the contents.

#### **2.4.5 Check Sheets**

Check sheet are forms used to collect the data in an organized manner. They are used to validate problems or causes or to check progress during implementation of solutions. Check sheets can come in different shapes and sizes, and Circle members must be able to design them to suit their needs.



## **How to Design a Checks Sheet**

### **Step 1: Include the data on the check sheet.**

This can be expressed as a single date (e.g., August 11, 2008), as a week (e.g., week ending August 15, 2008), or as a month (e.g., month ending August 31, 2008). The date is vital-to show when the data was collected.

### **Step 2: Include the Title**

The title should include the location and the type of information being collected-for example; the causes of breakdown of machine no.5.

### **Step 3: Indicate the name of the Data Collector**

Putting the name of the person who collected the data is important, especially in case there is a later need to clarify data gathered.

### **Step 4: Ensure that everyone is using the Same Form**

In cases where more than one member is collecting data, the Circle must ensure that the same form is being used by all the collectors. It is frustrating for the circle to have collected a large mass of data only to find out later that large-scale analysis is required and may be some of the collected data are not really required.

As the Circle designs its check sheet, it must consider some questions to establish how much information must b collected.

### **Q. What is to be done if the information to be Collected is Seasonal?**

An example would be if data on absenteeism were collected only during winter. This could be biased because absenteeism may be high also during summer when families went to go out of town. This means data must be collected through out the year, to cover all seasons.

**Q. Is there anything unusual in the normal pattern of working that  
Would affect the information being collected?**

For example, if a Circle is investigating how many people are in line waiting for their turn to make a transaction with a letter, it has to consider related factors like the operational status of the Automatic Teller Machine (ATM) inside the branch and the number of tellers present.

**Q. Is there anything unusual in the outside world that would affect the  
information being collected?**

For instance, the attack on the World Trade Center on September 11, 2001 might have affected the number of tourists that entered the United States. The Circle therefore, must collect data from July to November in order to get a complete picture of the number of tourists.

**Q. How often does this particular effect being studied happen?**

Does it happen everyday, or is it once a week, once a month, or some other frequency? If it happens everyday, five days of data is acceptable; if once a week, five weeks of data and if once a month, five months of data are needed.

Check sheets come in several types, depending on the objective for collecting the data. Some of the more common ones are as follows:-

- a. Recording Check sheet
- b. Location Check sheet
- c. Checklist Check sheet

#### **2.4.6 Histograms**

Processes output naturally vary from one to another. A product may be said to be uniform, but actually no two units are exactly the same. Using precision instruments, these differences will be detected. For example, if we examine the weight of a bottle specified as  $50\text{g} \pm 1\text{g}$ , we may be surprised to find that the bottles vary in weight.

## **How to Construct a Histogram?**

- Step 1: Determine the highest and lowest values.
- Step 2: On the top row, write the value observed, increasing from left to right.
- Step 3: In the left hand column, list in multiples of five, increasing from bottom to top, which makes it easier to keep count?
- Step 4: Put marks in the appropriate columns, starting from the bottom row and ascending by multiplies of 5.
- Step 5: Add the total number of marks per column and write the sum at the bottom of the row.
- Step 6: Indicate the standard. This helps pinpoint the columns that exceed the standard.

There are so many types of histograms. Some of them are as follows:-

- (a) Bell-shaped or Symmetrical Histogram
- (b) Skewed to right Histogram
- (c) Skewed to left Histogram
- (d) Cliff-like Histogram
- (e) Comb-like Histogram
- (f) Island-type Histogram etc.

### **2.4.7 Scatter Diagrams**

A scatter diagram examines the relationship between paired data. This tool is usually used by the QC Circle when it wants to establish the relationship between cause and effect, the relationship between one cause and another or a relationship between one cause and two causes.

Examples inside the relationship between an ingredient and the hardness of a product, the relationship between the speed of cutting and the variation in the length of part cut, the relationship between the level of illumination in a room and mistakes in validating a bank transaction slip.

The scatter diagram is used when a number of people or procedures are producing widely varying results.

The scatter diagram may show that one variable have positive correlation, have negative correlation, or have no correlation at all.

### **How to Construct a Scatter Diagram?**

- Step 1:** Collect data samples of pairs whose relationship is to be studied. Enter these data in a data sheet.
- Step 2:** Draw a vertical axis (effect); calibrate it from smallest to largest value (From top to bottom).
- Step 3:** Draw a horizontal axis (Cause); calibrate it from smallest to largest value (From left to right).
- Step 4:** Plot the paired values. If values are repeated, make concentric circles (in the graph indicated as pink).
- Step 5:** Plot data in a graph, with material content as the horizontal axis and elongation as the vertical axis.

### **2.5 Problems for Implementing the Quality Control Circles**

1. Employees negative attitude towards the QCC.
2. In case of Nepal, employees think that getting the membership of QC and participate
3. Top management always wants to control all QCCs.
4. (The QCC activities are totally volunteer services where workers meet regularly as a formal meeting and tried to solve their work related problems. But the management of Nepal wants to direct and control these activities according to them. This creates a kind of problem to implement the activities of the QCC)
5. Employees less motivation towards their jobs.

6. (In case of Nepal, all the SMEs are providing very low salary to their staff and the workers and makes them to do very hard work. This demotivates the workers towards their job.)
7. Lower level employees don't want to invest their extra time for QCC.
8. (Due to the lower salary workers always wants to do overtime (OT). They do not want to spend their time in volunteer services like the QCC activities.)
9. The top management doesn't want to empower their employees.
10. (The top management thinks that only "MC Gregory's"- "Theory 'X' of motivation" can improve the productivity of their employee & the organization.)
11. The top management has feats for unknown.
12. (The top management thinks that QCCs may become a kind of groups within the organization that may pressurize the top management in the future to do the decisions in their favor. Also they may involve in politics that brings unionism in their small or medium organization.)
13. Employees divert their mind towards the political issues of the organization.
14. QCC leaders & the Management Representative (MR) also have lack of knowledge about how to operate the QCCs. This also creates a kind of big problem to implement the QCC activities.
15. All employees have lack of knowledge about the QCCs & its benefits.
16. Language problems. (i.e. all the available documents about QCCs are in English language; but all lower level of employees are totally unknown from the English language. This is the reason they does show their interest on QCCs.)
17. The organization doesn't want to invest in lower level employees by hiring the QCC specialist as a trainer to provide them the training about the QCC.
18. Lack of QCC specialist in the market is also creates a lot of problems for successfully implementing the QCC.

19. Discipline problem within the organization.
20. (Most of the employees within the organization are very old and their job is also secured due to the fix job placement facilities. This is the reason that they have not any kind of affair from the top management. Thus they think that it is not necessary to follow the top management's each and every decision. As for example; some of them does not participates in the training provided by the organization to their development. The top management directs them to participate in that training program.)

## **2.6 Problems of Small and Medium Enterprises (SME's)**

Small and Medium enterprises has been facing too many problems in their regular production and operation life's. The problems may be internal as well as external too. The following figure shows the problems of Small and Medium enterprises.

### **(i) Internal Problems**

Internal problems are those problems that can be controlled or minimized by the organizational management. It is also called controllable problems. These types of problems come in our regular production and operation life and the management must have to manage it within a time. It also decides the ability of the management that how they find out the perfect solution of that particular problem. Following are the different types of Internal Problems that emerged in the Small and Medium Enterprises (SMEs):

### **) Financial Problems**

Finance is the main source of from which an organization operate successfully. It is that types of liquid assets that are used in the daily work life. The finance are mainly divided into the three types, that are Short-term Finance; Medium – term Finance and the Long-term Finance.

In Nepal most of the SMEs are suffering from these types of financial problems. Money scarcity in the market, High interest rate, not availability of credit facility and the nature of Sole Trade Business has creates the financial problems within the organization.

### **) Problems of Raw materials**

Not availability of the qualitative raw materials is also a kind of big problem for the SMEs in Nepal. The quality of raw material plays vital role for the quality of the final products. Due to the absence of qualitative raw material at reasonable price, the organizations are not able to produce qualitative products at cheap price.

### **) Problems related to qualitative manpower**

It is said that only the right man at right place can increase the productivity of the organization and the qualitative production in the product. But in case of Nepal, here is too much scarcity of skilled manpower and the SMEs are not able to hire skilled manpower from foreign country due to the financial problem. This is also a kind of big problem of the SMEs in Nepal.

### **) Internal Union and Associations**

Now a day's political environment has been too much affecting the internal working environment as an Union and Associations. Due to the protection of different unions within the organization workers are going to become undisciplined. This disturbs the working environment of the organization and the productivity has been decreased day to day.

### **) Resistance to Change**

Change is the universal truth. Everyone must have to accept it and they have to change themselves according to the change, otherwise the change will change them. Hiring the high capacity machinery, making the system automatic, computerizing the whole system of the organization, change in the

management system etc. is the example of change. In case of Nepal, the employees do not accept any kind of change. This is the reason; the SMEs of Nepal are not able to change themselves according to the demand of the time.

## **(ii) External Problems**

The external problems are those types of problems that the management of the organizations are neither able to control them nor able to make change them. The external problems are the problems that emerged from outside the organization and the organization also affect from it. Thus the organization has to make the policy according to the external problem that the organization must have to face in the future.

### **) The problems arises due to Globalization**

Now a day, the globalization of the world business has been creating too much problems for the SMEs in Nepal. Due to the globalization, Nepalese SMEs are facing too much unnecessary problems like Product competition, Quality competition, Brand competition, Price competition etc. Here, all Nepalese SMEs has to compete with the different multinational company's products. This is creating big problems to them.

### **) Competitor's Activities**

The SMEs of Nepal has low financial capacity in comparison to the competitors. This is the reason; it does not able to take different competitive advantages from the market competition. They have neither qualitative manpower nor the equipments through which they can compete with others.

### **) Problems causes due to Multinational Companies**

Different multinational companies and their products have been creating different types of competition and problems for the SMEs. The large investment business like multinational companies has used modern technology in their production that creates big problem for the SMEs which are using very old technology.



### **) Social Problems**

The society where the SMEs are established and producing their products has also created big problems for the SMEs. The society expects the social responsibility from the SMEs, which is sometimes may not be possible due to the lack of finance. As a result the society responds negatively with the SMEs. The society makes different types of obstacles like not to do air pollution, sound pollution, water pollution, soil pollution etc. to full fill their demands from the SMEs.

### **) Energy Related Problems**

In recent some years, the energy problems are creating very big problems in Nepal. The Nepal has been facing up to 18 hrs daily electricity's load shading, which is directly affecting the production and operation of the SMEs in Nepal. Most of the SMEs have been closed in the winter season when the load shading was in the pick point.

### **) Political Problems**

Nepalese political environment is too bad since last more then one decades. Different types of BAND have been directly affecting the performance of the SMEs. Due to the different band the SMEs are not able to get their raw materials timely. Also they can't able to supply their finished products. Different types of demand from the different Labor unions are also providing the bad effect on the SMEs of Nepal.

### **) Safety Problems**

It is also very big problem emerged in Nepal. Different armed groups' demands very high amount of donation monthly. If the business does not fulfill their demand then they do abduct their owners, their family and some times they killed them too. These types of unsecured condition create very big problems for the SMEs.

### **) Problems related to the Suppliers**

In case of Nepal, very less number of suppliers is available here. In this situation the quality and price of raw materials depends upon the suppliers not to SMEs. This is also a very big problem to the SMEs in Nepal.

### **) Problems related to the Technology**

Most of the SMEs are labor based industries. And the left has very old technology. In this situation, their production cost becomes very high in comparison to the large and multinational companies of the global world.

### **) Lack of Quality**

The SMEs of Nepal has not able to produce best quality due to the old technology and less qualitative raw materials. Its quality also affected by the unskilled manpower used in the production. The quality of the product has also affected the demand of the product that finally affects the profit of the product too.

### **) Not able to certify through Laboratory**

Although the products of the SMEs are able to meet the international standard, but the company and the Nepal government too has not well equipped laboratory to certify them. This creates a kind of problem related to the quality of the products, because foreign country does not accept without lab rotary certified products.

### **) Need of International Standard**

The need of International Standard like ISO 9001:2000; ISO14001:2000; etc. are a kind of visa for a product or brand name that can easily supply to the other countries. But in case of Nepalese SMEs, they have not these types of International Standard Certificate. This is also a kind of big barriers to them to send their products in the international market.

## **) Management System**

In case of Nepalese SMEs, its management system is too much old. Generally owners themselves are the manager of the organization. Hence, in most of the cases they have not any knowledge about the modern management system and the scientific management system. This is the reason too many problems like scarcity of Stocks, Finances, Qualitative and skilled Manpower arises in their organizations.

### **2.6.1 Major Problems Facing Businesses in Nepal**

Interference, Lack of Finance, Small market, Lack of mutual trust, lack of efficient manpower, labor problems, inconsistent rules and regulations, unsuitable tax policy, lack of technical knowledge and lack of basic infrastructure are the major problems facing businesses in Nepal.

#### **1.) Interference**

Interference is the main problem of management in Nepal. Government and political leaders interfere in the management of public enterprises of Nepal. Similarly, members of greater share holder's family interfere in the management of private firm. Such interference is found in all the managerial functions like planning, organizing and controlling.

#### **2.) Lack of Finance**

The other management problem of major industries is the lack of necessary financial resources. Finance is needed to establish and operate an industry. It is difficult to get loan from banks for industry. Banks provide loan only by taking good security. As good loan proposal is to be prepared, copy of feasibility study is to be attached with and complex process is to be fulfilled, collection of financial resource becomes very difficult in Nepal.

### **3.) Small Market**

Nepal's market is small and limited. There is no access to all parts of the country. As small quantity of goods id to be produced for small market, the production cost reaches high. As a result, the price of goods also goes high. Since the Chinese and Indian goods enter Nepal at low price, Neplese industries cannot compete with the Chinese and Indian goods. This also has shrunken the market of Nepalese industries. Let's not talk about export of Neplese goods; they even have not been able to compete with the goods of different countries in Nepal. So, small market is also a problem of management.

### **4.) Lack of Mutual Trust**

There is dearth of mutual trust in Nepal. Mutual trust cannot be found even among the departments, level and employees of organization. Due to lack of trust, authority is not delegated to the lower level. Such mistrustful environment becomes detrimental to the industries or organizations. Similarly, such mistrust is found between public and private sectors. The government plays only the roll of controller rather than helper. So, lack of trust has remained as great problem of management in Nepal.

### **5.) Lack of Efficient Manpower**

Efficient and skilled manpower cannot be found in Nepal's labor market. Labour is supplied from the crowd of unskilled and inefficient people. This creates a problem in management. Only traditional labor from agriculture sector is supplied to industrial sectors. There is no more option then that, nor can be found experienced labor out of agriculture sectors. Totally inexperienced and unknown persons are to be employed and make them experienced. So, this is also a management problem in Nepalese industries.

## **6.) Labor Problem**

Labour problem is another problem in Nepal. The labor organizations give pressure on management to fulfill their interest by holding demonstrations, calling for strike, locking up, Gherau, sit in etc. As the leaders of labor organizations are affiliated to political parties and leaders, the labor organizations become strong. The management is compelled to compromise with the labor organization even against the interest of the enterprise or organizations.

## **7.) Inconsistent Rules and Regulation**

Inconsistency of government rules and regulations is another problem of management. The policies, rules, acts and regulations do not agree with one another. So, it becomes difficult to implement them. Unnecessary rules and procedures are to be followed in the time of establishment of organization and one window policy cannot become effective.

## **8.) Unsuitable Tax Policy**

The Nepal's tax policy is not suitable. Value added tax (VAT) and local development tax have been proved as the obstruction in the industrial sector. Due to the lack of cooperation by the industrial sector, VAT has not become effective even for such a long time since its implementation. So, the absence of proper and suitable tax policy has become a problem of management.

## **9.) Lack of Technical Knowledge**

The managers working in the organization should have technical knowledge. But the managers working in the business organizations of Nepal have no technical knowledge. Because of the absence of technical knowledge in other employees, except the related ones, organizational performance can not be effective. In the absence of technical employee or if one having knowledge quite the job, then the organization has to bear a great loss. So, the lack of technical knowledge in employees is also a great management problem.

## **10.) Lack of Infrastructure**

The infrastructures such as transport, communication, electricity, water supply etc. become necessary for industrialization. Before 1950, there was no transport facility in Nepal. But, comparatively these infrastructures are available today. Among them, a great revolution has taken place in the development of communication sector.

As Nepal is a hilly country, the transport problem has remained as permanent problem. Transport facility has reached only at a few places. The main means of transport is truck. It is supposed to be a costly means in business purpose. Train and Ship transports are important in Nepal. Even the truck transport is badly affected in Band or Strike Period. Electricity supply is also not regular in Nepal. Load shedding, voltage fluctuation, disorderly supply etc. are the persisting problems of electricity. The price of electricity is very high in Nepal. The cost of electricity is the highest in Nepal in the World. It increases the cost of goods. There is scarcity of drinking water even in the cities like Kathmandu and Pokhara. In comparison to others, communication system has developed much. But, since it has not been distributed in equal and balanced manner, communication facility is limited in city areas. Postal services have not been modernized. These are also the problems of management in Nepal.

## **2.7 Review of Related Studies**

Before this study, no any research study is conducted on TQM. Some research can be found on Productivity of the organization, but that is not sufficient for TQM. In this study we can found the effect of QC on SMEs in case of implementing the TQM approach.

For the purpose of thesis writing, the researcher will review many published & un published data; Articles; Journals; different internet Websites and another source of Information.

### **2.7.1 Review of Journal/Article**

Articles entitled "TQM in Nepal: A continuity problem." Written by Prof. Dinesh Chapagain published in his web site has reflected the current scenario of current Nepalese business and the effect of the QCC are as follow.

I also had the opportunity to present the Nepal experiences and the difficulties faced in implementing a sustainable TQM system during a regional seminar on Japanese Style Management at Colombo, Sri Lanka, three years ago. Those cases were highly regarded and endorsed by the participants agreeing that Sri Lanka too had a similar experience. I learnt that the Nepali cases reflected similar situations in most countries, and I need not feel so frustrated after all.

Two typical cases presented in the accompanying boxes shed light on the problems of TQM implementation in Nepal. As is obvious, the reason for the problems is nothing but the thinking and preference of individuals, which in turn are influenced by their psychosocial and cultural backgrounds. It is no use talking about only the technical aspects of TQM and quality circles if we cannot change these individual traits.

An observation of various enterprises that tried implementing the programmed revealed a lack of whole-hearted support from the owners or the top managers. Though some energetic managers and external experts were very enthusiastic, the zeal for continuous improvement, the approach of collaborative action, and the passion for systematic problem solving were pathetically missing.

At this juncture, it becomes necessary to understand the traits, thinking processes and preferences of individual stakeholders who include employers/managers, workers/staffs, and customers/communities. So, in a country like Nepal, instead of trying to convince entrepreneurs to implement TQM simply by narrating its virtues and successes in countries like Japan, USA and Singapore, the whole approach to TQM has to be reengineered to a

different mode. We have to reach out to the roots, start by nurturing the individual traits towards the psychological profiles that are suitable for TQM.

### **2.7.2 Internet Search on 2008/1/20**

Prof. Dinesh Chapagain (2008), though the importance of TQM and Quality Circle in productivity enhancement and improving competitiveness has been realized in Nepal for about two decades, the pursuit of TQM and quality management implementation and consolidation here has been rather frustrating, and TQM professionals have started thinking of TQM as a foreign subject which cannot be harvested in this country. I have read about such difficulties experienced in almost all countries. How can Nepal be any different?

The National Productivity and Economic Development Centre (NPEDC), a focal point of the Asian Productivity Centre, Japan, has been promoting this concept through training and consultancy services. A number of Nepali entrepreneurs, professionals, academicians, supervisors and work leaders have developed awareness about productivity, quality management system and total quality management. But, hardly any organization is actually implementing TQM on a continuous basis. Why is it so?





I put this question obliquely to two famous Deming Prize winners, Dr. Hitoshi Kume and Dr. Noriaki Kano. They are recognized as the left and right hands of Prof. K. Ishikawa, the father of Quality Control Circles and TQM in Japan. Their reply was the same – TQM is a universal concept, and it is feasible in all countries in all types of organizations, manufacturing, and service and even in the government. They said that TQM was definitely made and tested in Japan with overwhelming success, but it has been successfully adopted by many developing and developed countries.

I discussed this matter with some TQM champions of this region too, as they have more or less the same culture and values as we have. Sunil G. Wijesinha (the CEO of Merchant Bank of Ceylon and recipient of APO productivity award for his successful pioneering work in promoting productivity in Sri Lanka) and AMM Khairul Basar (General Secretary of Bangladesh Society of Total Quality Management) explained that the successful implementation of TQM depends on macro-environmental factors such as economic growth, the socio-cultural values and beliefs of entrepreneurs, attitudes of trade unions, government commitments etc. Their opinion was that TQM and productivity movement need more time to be really successful in our part of the world.

Then, three years ago, I got a chance to meet the American quality management champion, Donald L Dewar, in Lucknow, India. Revealing the teething problems he faced while implementing quality circles at Lockheed and other companies in the USA, he said that TQM looks like a universal phenomena, but a lot of training and education was necessary, especially for entrepreneurs or managers. It is an arduous process, but when the entrepreneurs realize its importance, it will immediately begin to show results. For this, unstinting top management commitment is a prime necessity.

## **CHAPTER - III**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

Research methodology is a way to systematically solve the research problem. It is an art of scientific inquiry "Market research specifies the information required to address the issue, designs the method of collecting information; manages and implement the data collection process; analyze the results; and communicate the findings and their implications (Marketing News, 1987:1)

Research methodology includes the following concepts as they relate to a particular discipline or fields of inquiry:-

1. A collection of theories, concepts or ideas;
2. Comparative study of different approaches; and
3. Critique the individual methods

#### **3.2 Research Design**

The research design is an organized approach and not a collection of loose, unrelated part. It is an integrated system that guides the researcher in formulating, implementing and controlling the study. Useful research design can produce the answers to the proposed research questions.

The research design requires specification of procedures involving decisions relating to what information are to be generated, from which sources, by what procedures, and how the information are to be analyzed.

According to Donald Tull and Hawkins" Research designs the specification of procedures for collecting and analyzing the data necessary to help identify or react to a problem or opportunity..."

The research has been divided into four main phases. Phase 1 includes sample selection; phase 2 includes field visits and survey followed by phase 3 data

analysis and finally phase 4 represents the desk study for conclusion and recommendation of research.

### **3.3 General Research Activities**

#### **3.3.1 Sampling**

Research can be based on census or a sample. All the items under consideration in any field of inquiry constitute a 'universe' or 'population'. A complete enumeration of all the items in the 'population' is known as a census inquiry. When some items of the 'population' are selected for inquiry it is known as 'samples' and the scientific process of selecting the samples is known as 'sampling'.

#### **3.3.2 Population**

The term population or universe for research means all the member of any defined class of people event or objects.

A well defined numbers of Nepali Paper Products owner and executive and administrative level manager in Kathmandu have been taken as a research population by the researcher in this research study.

#### **3.3.3 Sources of Data Collection**

The practice of documentation system in SMEs in Nepal is very poor Country. There were limited data sources available to industries, however some reports on application of quality and environmental tools were found. Technical catalogues and marketing documents were readily available but resource consumption and environment related information did not appear to exist. Most of the data were generated in discussions, interviews and observational evidence and through questionnaire with SMEs.

Different source materials as publications, journals, progress reports, annual reports, case studies, departmental activities, articles, newspapers and photos

were collected during the site visit to industry, government officials and stakeholders. Some relevant data of different countries for comparative case studies were collected from interest to support the responding to research questions.

All the data collected and presented here are divided into two categories. That are as follows:-

- ) Primary Data
- ) Secondary Data

### **3.3.3.1 Primary Data**

While collecting primary data and information, the different method has been adopted. They are:-

#### **) Observation Method**

Under observation method, the researcher records the respondent's overt behavior, taking note of the physical conditions and events. Observations are of two types: participative and non-participative.

#### **) Interview**

The interview method of gathering primary data is not only popular but also very effective. Interview method is adopted for investigation factors such as consumer opinion, attitude, motivation and perception. There are three types of interview: personal interview, in-depth interview and focus group interview.

#### **) Questionnaire Survey Method**

Questionnaire survey is extensively conducted to gather primary data. Most census data is based on questionnaire survey. Under this method, a series of structured question for seeking answer from the respondents are used. Questionnaire method is more versatile as many research problems can be tackled with questionnaire survey. Questionnaire survey is a suitable method

when ideas, knowledge, feelings, beliefs, opinions and basis demographic information from a large number of consumers needs to be collected. The method has the advantages of high speed and low cost. Questionnaire survey can be conducted through mail, interviewer administered and self-administered method.

## **) Secondary Data and Information**

Secondary data are actually the results and data collected by previous investigators. It provides the researchers with a considerable amount of useful information.

With reference to research study, the different secondary information has been collected from different sources. The different sources are information and records kept by Departments, Divisions and Units, published materials, books, booklets, journals, magazines and similar previous dissertations and other publications

### **3.4 Data Collections Procedures**

#### **3.4.1 Mail Survey**

A Questionnaire was set to ten randomly selected SMEs (ANNEX-.....). The questionnaire dealt with activities that had been taken into consideration in the industry; what factors were major constraints for implementing CP, what causes the organization to explore CP. Unfortunately no response was observed.

#### **3.4.2 Telephone Survey**

A telephone survey was directed at people who represented entrepreneur or director of the company and government officials. The duration of telephonic survey was 7 minutes to 15 minutes depending on responds. The discussion base was focused on barriers to and drivers for QC implementation.

### **3.4.3 Mass Survey**

An introductory session to peer organization was planned to be organized by the chamber of commerce. The introductory session would help to acquaint the audience with the topic and with basic information regarding the research work. But, due to political problems and lack of financial resources, the planned activities could not taken place in time.

### **3.4.4 Field Survey**

The field survey was carried out by visiting industries and organizations from 2065/05/03 to 2066/02/23.. And it covered Kathmandu valley as base area of research. The semi structured questionnaire (Section .....), discussion, observation and objective evidences were the basic tools and techniques of the field survey. Both open and closed types of questions were used to acquire quantitative as well as qualitative information.

One discussion program regarding implementation of QCC and its tools was organized with shop floor employees in one medium industry i.e. Nepali Paper Products Pvt. Ltd., Sitapaila on (B.S.2065/5/13 Friday).

## **3.5 Data Processing, Tabulation and Analysis**

The raw data collected through the questionnaire are thoroughly checked, complied and presented in appropriate to facilitate analysis and interpretation. Different statistical tools like graphs, bar diagrams, percentage and pie- chart have been used to make the information easy and understandable

### **Method of Data Analysis**

The data collection from different sources are classified, tabulated and analyzed according to the needs of the study. Necessary tables are constructed to fit the data obtain from different sources.

## CHAPTER - IV

### DATA PRESENTATION AND ANALYSIS

In this chapter the data and information derived from the NPP's management and the QCC members are presented and analyzed according to the objective of the study. The survey is held by the direct observation method. Classification of the employees and their respective outcomes are tabulated and presented in diagrammatic way in this chapter.

#### 4.1 Data related to the Weekly Production in NPP

**Table 4.1**  
**Items Produce from NPP (Par Week)**

Items	Production Per Day (Before QCC)	Wastage Per Day (Before QCC)	Production Per Day (After QCC)	Wastage Per Day (After QCC)
Note Book	1400	85	1600	45
Photo Frame	900	60	1050	35
Gift Items	500	75	675	75
Envelop	5000	40	7000	20
File	3000	80	3000	50
File pan	1500	95	1570	35
Paper Jam	300	87	500	45
<b>Total</b>	<b>12600</b>	<b>522</b>	<b>15395</b>	<b>305</b>

*Source: Field Survey in NPP*

After the observations of NPP we found that its weekly total productions are 12600 units where it had made 522 units wastage before running the QCC program. After running the QCC we found drastic difference in production as well as its Quality and wastage too. The table given above shows that after running the QCC the production had increased by 2795 units. This means the production became 23% more then old production (production before running QCC). On the other hand the wastage had been decreased by 522 units to 305 units. This means the wastage decreases by 42% from the productions before running the QCC.

## 4.2 Measurement of Labor Productivity Before and After QCC

Productivity is the relationship between the output produced by the organization and the Input used to produce that quantity of output. The labor productivity can be measured by using the following formula: -

$$\text{Productivity} = \frac{\text{Output (Unit Produced)}}{\text{Input}}$$

The Labor productivity is used to measure the efficiency of the labor used in the organization. It is the relationship between the output produced by the organization and total number of labors used to produce that quantity of the output. Following are the formula of the labor productivity of an organization: -

$$\text{Labor Productivity} = \frac{\text{Output (Unit Produced by the workers)}}{\text{Input (No.of workers used for production)}}$$

**Table 4.2**

**Data of Labor Productivity before and After QCC**

Items	Production Par day before QCC	No of Employees Used in Production	Productivity Before QCC	Production Par day after QCC	Productivity After QCC
Note Book	1400	50	28	1600	32
Photo Frame	900	40	23	1050	26
Gift Items	500	17	29	675	40
Envelop	5000	15	333	7000	467
File	3000	20	150	3000	150
File pan	1500	28	54	1570	56
Paper Jam	300	30	10	500	17
Total		200			

*Source: Field Survey in NPP*

The table 4.2 shows the labor productivity before and the after the QCC program. According to the table, the productivity of the workers used to make the Envelop is increased maximum in comparison to the others. On the same way, the productivity of the labor used to make Paper Jam has become



minimum change in comparisons to the others. Similarly, the productivity of the workers used to produce the Photo Frame is increased from 23 to 26 units. But there is no change in the productivity of the labors used to make the File after the QCC program.

### 4.3 Hypothesis Test of Labors Productivity

#### Step (I): - Null Hypothesis

$H_0 : \mu_x = \mu_y$  i.e. There are not significance difference between the labors productivity before and after the QCC programs. This means the QCC programs does not increase the labors productivity.

#### Step (II): - Alternative Hypothesis

$H_1 : \mu_x < \mu_y$  i.e. The average labors productivity before the QCC program is less than the labors productivity after running the QCC programs. This means the QCC programs increases the labors productivity.

#### Step (III): - Test Statistics

$$t = \frac{\bar{d}}{\frac{sd}{\sqrt{n}}}$$

Where,

$$\bar{d} = \frac{\sum d}{n}$$

$$sd^2 = \frac{1}{n-1} (d - \bar{d})^2$$

$$= \frac{1}{n-1} \left[ d^2 - \frac{(d)^2}{n} \right]$$

Given,

No. of items on the Observation (n) = 7

Productivity Before QCC (x)	Productivity After QCC (y)	d = x - y	d <sup>2</sup>
28	32	- 4	16
23	26	- 3	9
29	40	- 11	121
333	467	-134	17,956
150	150	0	0
54	56	- 2	4
10	17	- 7	49
$\bar{x} = 627$	$\bar{y} = 788$	$\bar{d} = - 161$	$\sum d^2 = 18,155$

We have,

$$\begin{aligned}
 Sd^2 &= \frac{1}{n} \left[ \sum d^2 - \frac{(\sum d)^2}{n} \right] \\
 &= \frac{1}{7} \left[ 18,155 - \frac{(161)^2}{7} \right] \\
 &= \frac{1}{6} (14,452) \\
 &= 2408.67
 \end{aligned}$$

Now,

$$\begin{aligned}
 Sd &= \sqrt{sd^2} \\
 &= \sqrt{2408.67} \\
 &= 49.0782
 \end{aligned}$$

Again,

$$\begin{aligned}
 t &= \frac{\bar{d}}{\frac{Sd}{\sqrt{n}}} & \left( \bar{d} = \frac{\sum d}{n} = \frac{-161}{7} = -23 \right) \\
 &= \frac{-23}{\frac{49.0782}{\sqrt{7}}} \\
 &= - 1.24
 \end{aligned}$$

... Calculated  $|t| = 1.24$

**Step (IV): - Level of Significance; Degree of Freedom (d.f.) & Critical**

**Value**

$$\begin{aligned} \text{Degree of freedom (d.f.)} &= n - 1 \\ &= 7 - 1 \\ &= 6 \end{aligned}$$

$$\text{Level of Significance} = 25 \%$$

From Table,

$$\text{Tabulated Value } |t_{0.25,6}| = 0.71756$$

**Step (V): - Decisions**

Since, Calculated value of  $|t| = 1.24 >$  the Tabulated value of  $|t_{0.25,6}| = 0.71756$ .

Thus, we accept Alternative Hypothesis and reject Null Hypothesis. This means, the QCC programs increases the labors productivity.

**Table 4.3**

**Percentage Change in Labor Productivity after QCC**

Items (1)	No of Employees Used in Production (2)	Productivity Before QCC (3)	Productivity After QCC (4)	Change in Productivity (5 = 4-3)	Percentage Change in Productivity (6)
Note Book	50	28	32	4	14.28
Photo Frame	40	23	26	3	13.04
Gift Items	17	29	40	11	37.93
Envelop	15	333	467	134	40.24
File	20	150	150	0	0
File pan	28	54	56	2	3.7
Paper Jam	30	10	17	7	70
Total	200			161	100 %

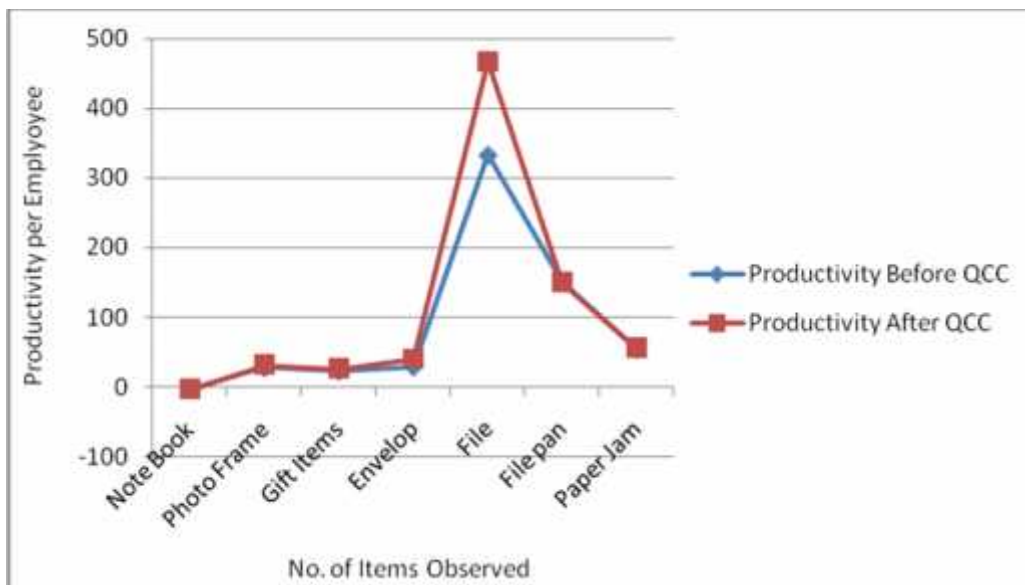
*Source: Field Survey in NPP*

Table 4.3 Shows the data related to change in labors productivity due to the QCC activities. From the table we find that among 200 employees of NPP, the average labor productivity in note book has been increased by 4 pieces which is 14.28 % of over all increased in labor productivity. In the same way, labor

productivity has been increased in Photo frame, Gift Items, Envelop, File pan and Paper jam by 3 pieces (13.04 %), 11 pieces (37.93 %), 134 pieces (40.24 %), 2 pieces (3.7 %) and 7 pieces (70 %) respectively.

Here one thing can that surprised us that, there is no change in the labor productivity of File making employees. This means the employees who are involved in making file are not able to get benefit from the QCC activities.

**Figure 4.1**  
**Change in Labor Productivity after QCC**



#### 4.4 Data related to the Workers Absenteeism

Workers Absenteeism is a very big problem for every organization, because it breaks the system of the continuous flow of production. Following table shows the workers absenteeism record and the reasons for absenteeism:-

**Table 4.4**

**Workers Absenteeism Rate (%) before and after QCC in NPP**

Reason for Absent	Absent Days Before QCC (x)	% Absent Before QCC	Absent Days After QCC (y)	% Absent After QCC
Illness	240	20	150	33
Cultural Festival	120	10	100	22
Family matter	180	15	90	20
Not Defined	660	55	120	25
Total	1200	100	460	100

*Source: Field Survey in NPP*

**Working Notes:-**

Calculation of workers Absenteeism Rate in NPP:-

Total Workers = 200 Persons

No. of Observations Days (Research days) = 6 months  
(150 working days)

Total no of employees working days =  $150 \times 200$   
= 30,000 Days

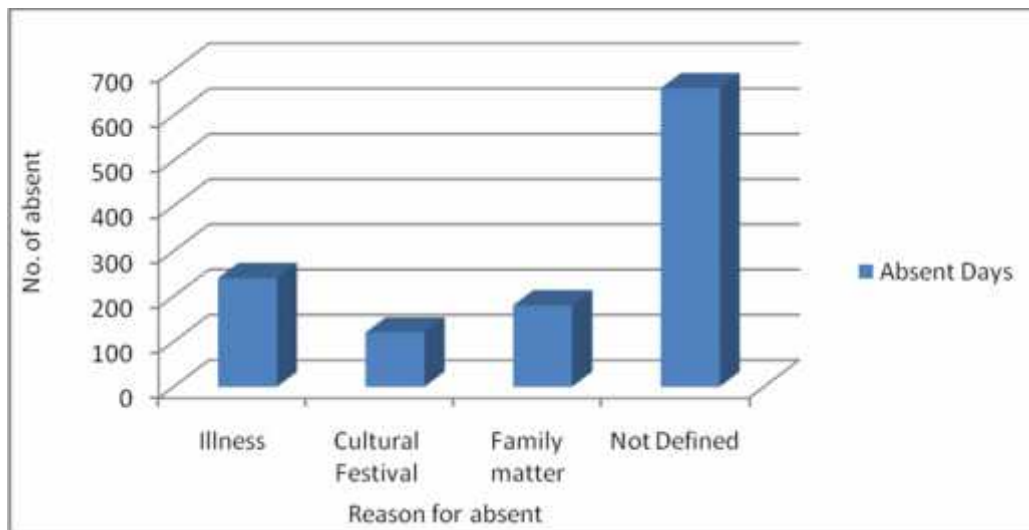
Now,

Total no of absenteeism = 1200 before QCC  
(According to Working Days)

Total no of absenteeism after QCC = 460 days  
(According to Working Days)

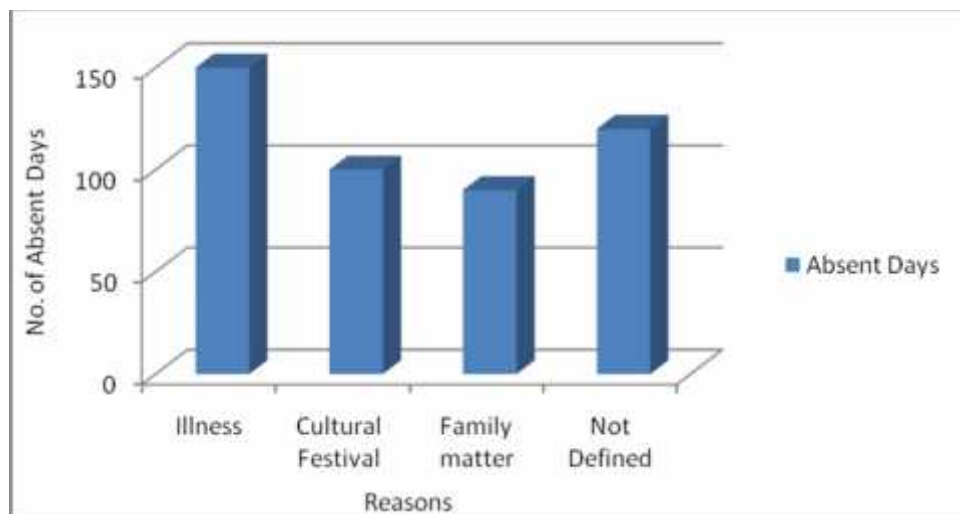
**Figure 4.2**

**Workers Absenteeism Days before QCC in NPP**



**Figure 4.3**

**Workers Absenteeism Days after QCC in NPP**



The figures no. 4.2 and 4.3 given above shows the data related to the workers absenteeism rate before QCC and after running the QCC program respectively. According to the figure no. 4.2, from the 30,000 worker's working days, 240 days the workers being absent due to Illness but after running the QCC programs this has been decrease to 150 days. These types of change happen due to the development of the health related life style of the employees which they learn from the QCC meeting. Here we can observe that 50 % of the

absenteeism due to the family matter has been decreased after the QCC activities. The absenteeism rate whose reason is not defined has been decreased by dramatically from 660 days to 120 days. This shows that the QCC activities has morally so much affect the employees that they were leave to get un-necessary absenteeism.

#### 4.5 Hypothesis Test of Absenteeism

##### Step (I):- Null Hypothesis

Ho :  $\mu_x = \mu_y$  i.e. The QCC can not morally empess the employees so that they decrease their absenteeism rate. This means the QCC does not decreases the employee's absenteeism rate of an organization.

##### Step (II):- Alternative Hypothesis

H1 :  $\mu_x > \mu_y$  i.e. The QCC can morally empess the employees so that they decrease their absenteeism rate. This means the QCC decreases the employee's absenteeism rate of an organization.

##### Step (III):- Test Statistics

$$t = \frac{\bar{d}}{\frac{sd}{\sqrt{n}}}$$

where,  $\bar{d} = \frac{d}{n}$

$$sd^2 = \frac{1}{n-1} (d - \bar{d})^2$$

$$= \frac{1}{n-1} \left[ d^2 - \frac{(d)^2}{n} \right]$$

Given,

Sample Size (n) = 4

Absenteeism rate before QCC (x)	Absenteeism rate after QCC (y)	d = (x - y)	Y = (d)
240	150	90	8100
120	100	20	400
180	90	90	8100
660	120	540	291600
x = 1200	y = 460	d = 740	d <sup>2</sup> = 308200

We have,

$$\bar{d} = \frac{d}{n}$$

$$\dots \bar{d} = \frac{740}{4}$$

$$= 185$$

Now,

$$Sd^2 = \frac{1}{n} \left[ d^2 - \frac{(d)^2}{n} \right]$$

$$= \frac{1}{4} \left[ 308200 - \frac{(740)^2}{4} \right]$$

$$= 57100$$

Again,  $sd = \sqrt{57100}$  [ $\because sd = \sqrt{sd^2}$ ]

$$= 238.956$$

$$\text{Calculated (t)} = \frac{185}{\frac{238.956}{\sqrt{4}}}$$

$$= 1.5484$$

...Calculated |t| = 1.5484



**Step (IV):- Level of significance; Degree of Freedom (d.f.) & Critical Value (C.V.)**

Degree of Freedom (d.f.) =  $n-1= 4-1= 3$

Level of Significance ( ) = 5%

From Table,

Tabulated value of  $t_{0.05;3} = 1.47588$

**Step (V):- Decision**

Since, the Calculated value of (t) is greater then the tabulated value of (t).i.e. Calculated  $|t| = 1.57459 >$  Tabulated  $|t| = 1.47588$ . We accept, Alternative Hypothesis & reject Null Hypothesis. This means, the QCC can decrease the disciplinary problems of an employee.

**4.6 Data related to the Absenteeism rate of the QCC members**

**Table 4.5**

**QCC Members Absenteeism rate before & after QCC in NPP**

Reason for Absent	Absent Days Before QCC (x)	Absent Days After QCC (y)	Change in absenteeism rate after QCC	Percentage change in absenteeism rate after QCC
Illness	50	36	14	7.61
Cultural Festival	32	20	12	6.52
Family matter	90	20	70	38.04
Not Defined	130	42	88	47.83
Total	302	118	184	100

*Source: Field Survey in NPP*

**Working Notes:-**

Calculation of QCC members Absenteeism Rate:-

Total Workers =40 Persons

No. of Observations Days (Research days) =6 months

(150 working days)

Total no of employees working days =150 × 40  
=6,000 Days

Now,

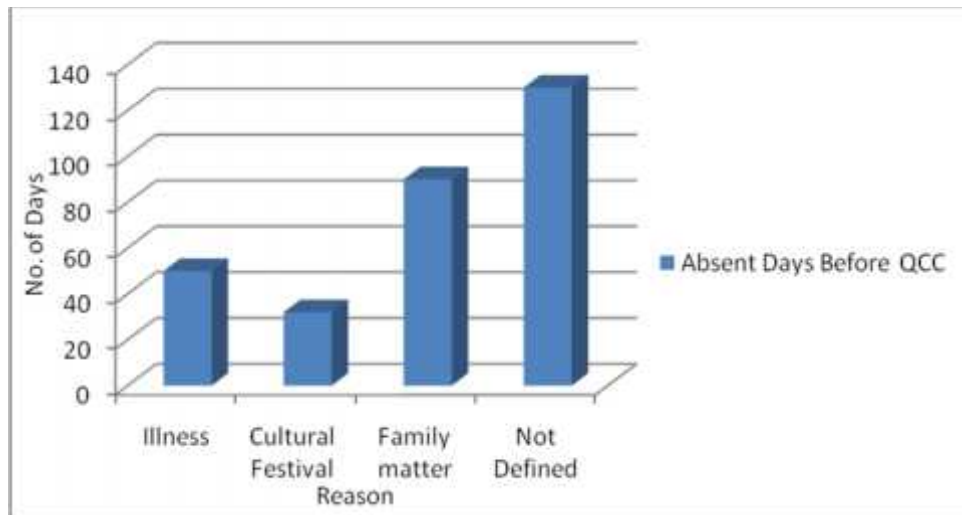
Total no of absenteeism before QCC =302 before QCC  
(According to Working Days)

Total no of absenteeism after QCC =460 days  
(According to Working Days)

Table 4.5- shows that there were 40 members of 4 QCC in NPP. It also shows that Total absenteeism rate of these members are 302 days (according to the working days) from which 130 days of absenteeism days they does not want to define however 90 days they spend as their family problems. This means the record shows that only 16.56 % absenteeism are due to Illness and 10.6 % due to Cultural Festival. Which can also been shown in the given figure no. 4.4.

**Figure 4.4**

**Absenteeism Rate of the QCC members before running the QCC program**

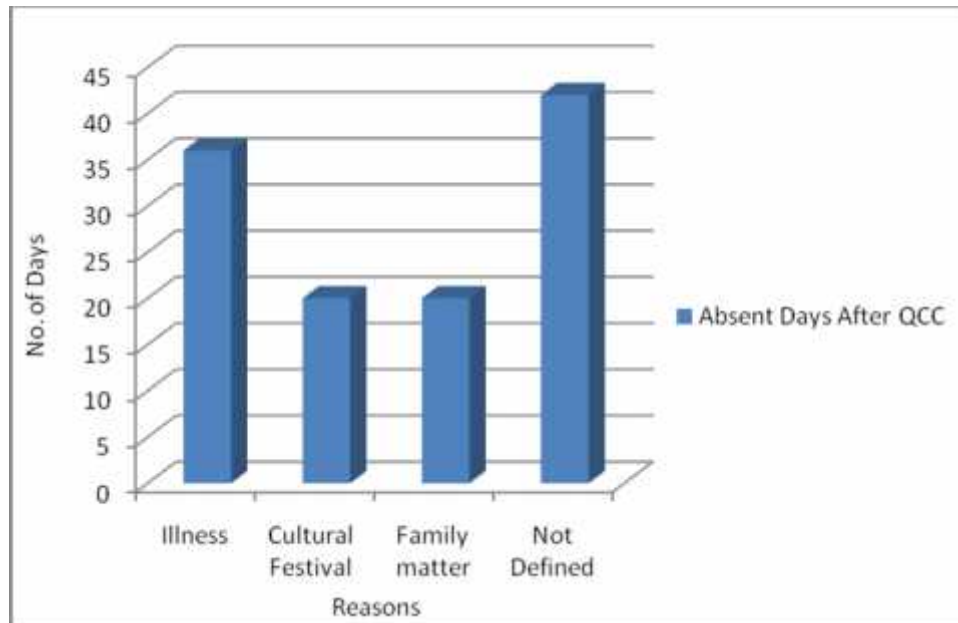


On the same way, the figure shows that after running the QCC program total absenteeism rate of QCC members' decreases from 302 to 118 days. It is 60.93 % less then the absenteeism rate before QCC. Here, the absenteeism rate due to Illness, Cultural Festivals, Family matters and not defined has been decreases by 7.61 %, 6.52 %, 38.04 % and 47.83 % respectively. Here we observed that

after running the QCC program the absenteeism rate of the employees are decreases as shown below in the figure no. 4.5.

**Figure 4.5**

**Absenteeism rate of the QCC members after running the QCC program**



**4.7 Data related to the Disciplinary Actions**

Following Table no. 4.6 shows that the number and types of Disciplinary Actions taken by Management against the employees before and after the QCC programs. The discipline related problems affect the work performance of the employees within the organization. It can challenge the command of the management within the organization. The disciplinary problem may disturb the controlling system of management. So the measurement of the disciplinary problems is most important for the organization.

**Table 4.6**  
**Disciplinary Actions Record**

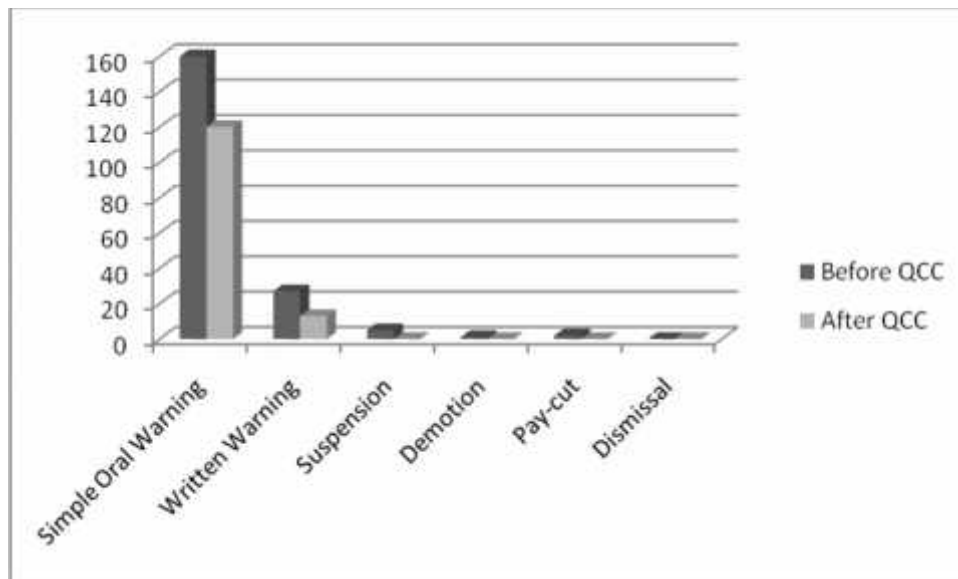
<b>S.N.</b>	<b>Types Of Actions</b>	<b>Before QCC</b>	<b>After QCC</b>
1	Simple Oral Warning	160	120
2	Written Warning	27	13
3	Suspension	5	0
4	Demotion	1	0
5	Pay-cut	2	0
6	Dismissal	0	0
	<b>Total</b>	<b>195</b>	<b>135</b>

*Source: Field Survey in NPP*

The table number 4.6 shows the disciplinary action record of the employees of the organization before implementing the QCC program and after implementing the QCC program. The table shows the disciplinary actions before the QCC is more than the implementing the QCC programs. In other word, the QCC activities had decreased the disciplinary problems of the employees. From the table we see that the no. of simple oral warning given by the management to the employees before the QCC was 160. But these types of action (Oral warning) have been decreased by 40 times after running the QCC program. Similarly, different disciplinary actions like Written Warning, Suspension, Demotion, Pay-cut has been decreased by 14, 5,1 and 2 times respectively. This shows that, the QCC program provides the moral effect of the employees so that they leave to do un-disciplined activities.

**Figure 4.6**

**Disciplinary Actions before and after the QCC**



The above figures show that there are 195 different disciplinary actions taken by the Management of Nepali Paper Products towards their employees before running the QCC. But it has been decreases from 195 to 135 after the running the QCC programs. Although the main target of the QCC was to decrease the wastage at zero level. But after critical examinations of each and every data, we find that the QCC has morally affected all the employees in this way that they become more disciplined and the disciplinary actions should be decreased by 30.76 %. This is the positive side of the QCC program, which helps to think all the employees and the management positively about the QCC in the organization.

#### **4.8 Hypothetical Test of Disciplinary Actions**

##### **Step (I):- Null Hypothesis**

$H_0 : \mu_x = \mu_y$  i.e. There are not significance difference disciplinary problems before QCC and after QCC. This means the QCC does not affect the discipline of an employee.

**Step (II):- Alternative Hypothesis**

H1 :  $\mu_x > \mu_y$  i.e. The average disciplinary problems before QCC are greater than the disciplinary problems comes after the QCC. This means the QCC can decrease the disciplinary problems of an employee.

**Step (III):- Test Statistics**

$$t = \frac{\bar{d}}{\frac{sd}{\sqrt{n}}}$$

where,  $\bar{d} = \frac{d}{n}$

$$sd^2 = \frac{1}{n-1} (d - \bar{d})^2$$

$$= \frac{1}{n-1} \left[ d^2 - \frac{(d)^2}{n} \right]$$

Given,

Sample size (n) = 4

Disciplinary Actions Before QCC (x)	Disciplinary Actions After QCC (y)	d = x - y	d <sup>2</sup>
160	120	40	1600
27	13	14	196
5	2	3	9
1	0	1	1
2	0	2	4
0	0	0	0
$x = 195$	$y = 135$	$d = 60$	$d^2 = 1810$

Calculations of sd<sup>2</sup>

$$Sd^2 = \frac{1}{n-1} \left[ d^2 - \frac{(d)^2}{n} \right]$$

$$= \frac{1}{6-1} \left[ 1810 - \frac{(60)^2}{6} \right]$$

$$= 242$$

Now,

$$\begin{aligned} Sd &= \sqrt{Sd^2} \\ &= \sqrt{242} \\ &= 15.5563 \\ \dots Sd &= 15.5563 \end{aligned}$$

$$\begin{aligned} \text{Again, } t &= \frac{\bar{d}}{\frac{sd}{\sqrt{n}}} \\ &= \frac{10}{\frac{15.5563}{\sqrt{6}}} \\ &= 1.57459 \end{aligned}$$

... Calculated value of  $|t| = 1.57459$

**Step (IV):- Level of significance; Degree of Freedom (d.f.) & Critical Value (C.V.)**

$$\begin{aligned} \text{Degree of Freedom (d.f.)} &= n-1 \\ &= 6 - 1 \\ &= 5 \end{aligned}$$

Level of Significance ( ) = 10 %

From table,

$$\text{Tabulated value of } |t_{0.1;5}| = 1.47588$$

**Step (V):- Decision**

Since, the Calculated value of (t) is greater than the tabulated value of (t).i.e.

Calculated  $|t| = 1.57459 >$  Tabulated  $|t| = 1.47588$ . We accept, Alternative

Hypothesis & reject Null Hypothesis. This means, the QCC can decrease the disciplinary problems of an employee.

#### **4.9 Data Related to the Measurement of Productivity (According to the Work Experience of the Employees)**

There are three categories of employees are working in the NPP. They are classified according to their work experience. They are classified as

1. Skilled workers
2. Semi skilled workers, and
3. Non-skilled workers

The non-skilled workers are those workers who come to the organization to do their work for certain days, only when work load become too much high. The non-skilled types of workers only do very simple works. As for example; bring the weighted goods, Re-manage the store, load and unload the goods etc.

The following table no. 4.7 shows the data related to productivity of these different types of workers. From the table we saw that the average productivity of skilled male before the QCC was 55 and skilled females productivity was 49 units. This has been increased to 75 and 68 units respectively. Similarly the productivity of the semi-skilled employees has been increased by 9 and 14 units to the semi-skilled male and female workers respectively.

**Table 4.7**  
**Measurement of Average Productivity**  
**(According to the Work Experience of the Employees)**

S.N.	Workers Categories	No of employees	Before QCC	After QCC
1	Skilled Workers	31	31	31
A	Male	13	55	75
B	Female	18	49	68
2	Semi-skilled Workers	135	135	135
A	Male	47	45	54
B	Female	88	32	46
3	Un-Skilled Workers	34	34	34
A	Male	7	--	--



B	Female	27	--	--
	Total (1+2+3)	200	200	200

*Source: Field Survey in NPP*

#### **4.10 Major Findings of the Study**

- J The data shows that only 34 % of total employees are male in the NPP. Left 66 % are female workers are working here. Among them 20 % male are skilled and 14 % females are skilled.
- J Similarly, 67 % and 21 % females are semi-skilled and Non- skilled workers respectively. On the other hand, 71 % male workers are semi-skilled and left 11 % male are non-skilled workers.
- J The nature of production needs too much sunlight. This is a reason that the organization can not do plantation inside its boundary. But the organization can do the plantation outside the organization as a Corporate Social Responsibility (CSR). This is not doing by the organization.

##### **4.10.1 Findings Related to the QCC**

- J The Quality Control Circles (QCC) are Japanese concept but it can also apply in Nepalese enterprises only by the support and help of the Top Management of the organization.
- J The employees do not want to involve in the voluntary services due to lack of the technical knowledge about the QCC and its effect on their regular work life.
- J The top management is afraid to run the QCC. Because they think that the role of QCC may politically pressurized them to cover their demand; because it becomes small groups to run their activities.
- J The QCC activities are the most powerful tools to meet their target. The target may be wastage reduction, quality improvement, decrease in productions related problems etc.
- J The observed data shows that the total weekly production after running the QCC had been increased by 23% of NPP. This means the QCC helps to increase in the production of an organization.

- ) The weekly wastage had been decreased by 42% of NPP due to the QCC activities.
- ) The top management breaks the volunteer (QCC) activities times to time by giving them extra work load. In case of highly demand for their products, the management ordered the QCC members that not to do QCC meetings for some days/ week/ month.
- ) The data shows that the QCC activities has morally so affected their members that they leave to take un-necessary absences and becomes more responsible towards the organization.
- ) The QCC activities in NPP had increased the co-ordinations among the employees as well as increased to maintain the better relation between the management and the employees.
- ) The QCC activities increase the better relationship between the management and employees. This is also a reason to increase in the productivity of the employees as well as the organizations too.
- ) The QCC activities increase in the motivations of the employees within the organization, due to the creativity activities and the employees participation in the decision making process.
- ) The departments (dying department) from which no any employees are involved in the QCC activities are not able to increase their productivity as well as them also does not able to improve the quality of their product.

#### **4.10.2 Findings Related to the Productivity and Discipline**

- ) It is observed that the QCC members of NPP became more productive and disciplined in comparison to the other employees whom are not involved in this volunteer services.
- ) The QCC activities had dramatically increased the intelligence of its members so that their decision making capacity and the creativity had been increased.

- ) The labors productivity of QCC members has been increased more then the employees who do not involved in the QCC activities.

#### **4.10.3 Findings Related to the Problems of the SMEs**

- ) There are three major types of problems facing by the Nepalese Small and Medium Enterprises. They are Economic problems, Social problems and the Political problems.
- ) Economic problems and the problems related to competitions are the common major problems of Nepalese Small and Medium Enterprises (SMEs).
- ) Most of Nepalese labors are so lezzy. They do not want to do creative work and they do not think about the organizations, they only think about themselves and the money. This makes the bad effect on the QCC members and their activities.
- ) The QCC are a kind of problem solving team who not only solve the problems that emerged in their regular working life, but these circles also helps on the new product development process.

#### **4.10.4 Findings Related to the Environment**

- ) The wastage water (colored water) has been affecting the soil near to the NPP. Although the company has been established a plat for the purification of water but that is not sufficient and the colored water has been creating the soil pollution.
- ) No any organization has been monitoring the NPP's ISO 9001:2000 and ISO 14001:2000 Certificates.
- ) The very bad smelled black Fume coming the NPP's dying sections are doing the environment pollution surrounding the NPP areas. But the organization has not serious to decrease these types of problem.



## **CHAPTER- V**

### **SUMMARY, CONCLUSION & RECOMMENDATIONS**

#### **5.1 Summary**

Total Quality management and the Quality production is the demand of global market. It is most necessary for every organization not only to face the global competitions but also to satisfy the consumers changing needs and wants. It is also necessary to meet the requirement of ISO 9001:2000.

In case of Total Quality Management (TQM), there are different tools that are used to do better management or the management system required for the ISO 9001:2000.

Quality Control Circles (QCC) is one of a tool among the seven tools of TQM, where many small groups (generally 4 to 10 persons from the same work place) of employees involved in the volunteer activities regularly improving the quality of the product. It also involved to reduce the cost as well as to find out the solution of the problems that they found their regular work life.

The concept of Quality Circle is primarily based upon reorganization of the value of the worker as a human being, as someone who willingly activates on his job, his wisdom, intelligence, experience, attitude and feelings. It is based upon the human resource management considered as one of the key factors in the improvement of the product quality and productivity. Quality Circle concept has three major attributes:

- a. QCC is a form of participative management
- b. QCC is a human resource development technique
- c. QCC is a problem solving technique.

The QCC applies systematic problem solving procedures for sustainable solution to problems in the workplace. The members identify the problem that keep recurring at their workplace and find out ways to solve them. They formulate appropriate plans to solve the problems, present the plan to the management, and implement them after receiving the do ahead from the management. Then the results are checked after implementing the plans and ensure that problems do not recur once they are eliminated. If a problem recurs, the plan is revised to ensure that the problem is solved permanently. Once a problem is permanently eliminated, the QCC selects another major problem to tackle.

The activities of individual QCC are continuously monitored by the facilitators. However, when a QCC of a particular department or section needs the help or support of other departments, the communication is done through the cross functional activities. Any issue or decision that needs to be referred to higher level is put up in the steering committee meeting.

One of the motivating factors of the QCC is the opportunity for the groups to present their cases to the management. After tackling every problem or effecting improvements, the groups prepare reports in line the QCC approach of systematic problem solving highlighting the quantitative and qualitative benefits of the improvement. The report is then presented to the management, generally during the steering committee meeting in the presence of the top and senior management where the efforts of the quality circles are duly recognized and possibly rewarded depending on the magnitude of the benefit brought about.

The Quality Control Circles also get opportunities to present their cases and share their experiences and showcase the positive results of their effort during the some annual function of the organizations or at seminars and quality control circle conventions outside the organizations. This highly motivates the

members. It also encourages others who have not joined QCC activities to join in.

## **5.2 Conclusion**

From the above study we have arrived to the following conclusion.

1. The QCC is a tool of the TQM where 4 to 10 numbers of people from the same work place get together and discuss regularly their daily life's work related problems. For this they held their meeting for some constant time gap (generally once a week) to solve their problems. This is totally volunteer services from the employees to the organization. Two parties get benefit from these types of volunteer services. They are:
  - i. The primary beneficiary of the QCC activities are the employees themselves who are involved this types of meeting are benefited as their personal development in different matters. They become more skilled as well as helpful and disciplined too.
  - ii. On the other hand, organization is the secondary beneficiary of the QCC activities within the organization. It get benefit as their qualitative production, wastage control at the minimum level, increasing the productivity of their employees and managing the better relationship between the management and the employees too.
2. The QCC activities are the Japanese approach, but now a day it is used in world-wide management practices to increase in the productivity and ultimately profit of the organization too. These activities makes employees helpful disciplined so that the management can empowered them at a certain level.
3. In case of Nepal, also the QCC activities have been successfully operating by giving the un-expected positive result. That is shows on the result of the case study held on the NPP since 2065/05/03 to 2066/02/23.
4. The QCC activities empowered the employees to solve their problems at their work field. As a result, the employees become happy and their motivation level towards the work has been increased. It also measured that, the employees are morally so much affected that they leave to get un-

necessary absent in the organization. They become more disciplined as well as more productive in comparison to the workers who are not involved in these activities.

5. The QCC activities make the employees more creative. As a result their new product development skill has been improved and the wastage that produced from the regular production has been decreased at the minimum level.
6. The QCC activities make the employees more responsible towards their work that they become more serious on their responsibility. As a result the work overload of the management has been decreased and the relationship between the employees and their management has been improved.
7. The organization is generating the profit from the society but it does not spending any amount of its profit to fulfill the CSR which is the major functions of the modern management system.

### **5.3 Recommendations**

- ) The organization must have to manage their inventory by the ABC management system of the Inventory. This will decrease their costs of the Inventory and helps to increase the profit of the organization.
- ) The result shows that the QCC activities have increase the productivity of the employees and it makes them too much morally disciplined. Thus the management must have to become more serious about the QCC activities and provide them more facilities so that these activities do not break its activities.
- ) No any organization is monitoring the ISO 9001:2000 Certificate of the NPP. This is very bad for the organization. Thus the organization must have to arrange an organization that will do regular monitoring about the ISO 9001:2000 Certificate of the NPP.
- ) The organization is spending too much money on the different types of training and the development of their employees. This is very good policy for the organization and employees too. But the organization



(NPP) is not measuring the effectiveness of the training program. This is only increase in the cost of the organization. Thus the organization must have to evaluate the effectiveness of the training given by the organization to their employee's personal development.

- ) It is observed that, there is not applying the scientific management system due the scarcity of the highly educated manpower. The staffs that are working in the management are not highly educated. They became expert on their work only taking the different training given by the organization. But training may give only little knowledge in spite of the educated person. Thus the organization must have to hire highly educated manpower as their staff.
- ) The top management of the organization (NPP) has to become more serious about the QCC and they must have to support their every activity in spite of giving the order 'not to do the QCC meeting in the time of the work overload.' The management has to support them and motivate them to continue the QCC meeting in case of the hard work pressure. This makes the employees more disciplined towards their work.
- ) The NPP must have to become serious about the Environment pollution that is emerged from them. The organization must have to become serious about decrease them by fulfilling the non-conformance report of the EMS observers.
- ) The organization is not doing any work for the society as the social responsibility of the organization. Thus the organization has to do the plantation program out side the organization on the first phase of its CSR. Then it can do other different activities for the society.

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**APPENDIX**  
**QUESTIONERIE (For the Management)**  
**(Before running the QCC activities)**

Namaste! I am Madhukar Thakur. I am studying in MBS at Shanker Dev Campus. Currently, I am conducting a study on the Role of QCC in Problem Solving for Small and Medium Enterprises (SME's) to prepare my thesis. In this connection, I am going to ask you some questions about the Company, and the QCC activities which are running here.

**Part One: - Company Profile**

1.
  - a. Name and address of the company-
  - b. Type of Business: -----
  - c. Number of Employees: -----
  - d. Total paid up capital: -----
  - e. Established date. -----
  - f. Legal status. -----
  - g. Contact person. -----
2. Years of Operation: -----
3. When did the company get ISO 9001:2000 Certificate?
4. What is the annual Production capacity of the organization?
5. No. and Types of labors used in Production.
6. Do you know about the QCC?
7. Is here QCC activities has been running or not?
8. What is the status of QCC in this Organization?
9. Does QCC increase the productivity of the Organization?
10. Does the QCC activities affect on the moral behavior of the employees?
11. How many QCC are running in your organization?

12. Does the QCC activities are running regularly or not?
13. What are the factors affecting the QCC activities in your Organization?
14. Which types of problems your organizations have to face regularly?
15. Are you keeping the record of productivity of this organization?
16. What are the provisions for the EMS your company has been doing to maintain the ISO 14001:2000?

**THANK YOU !**



## QUESTIONARIE (For the Workers)

### Part Two - Workers Profile

1.    a.    Name and address of each worker-----  
      b.    Passion / Post in the Organization. -----  
      c.    Work Experience. -----  
      d.    Educational background. -----
2.    Knowledge about the QCC. -----
3.    Are you involved in the QCC activities? If Yes, then when and  
      Where?-----
4.    How many members was in your QCC? -----
5.    The management has supporting you in this activities or not?
6.    Are you able to solve your problems from QCC activities or not?
7.    How many meetings had you attained in the QCC in a month?
8.    Your all meetings are regular or it has been breaking time to time?
9.    When did you do your QCC's meeting?
  - a.    At office time                      b.    After the office time
10.   Does the QCC members are involved in the political activities?
11.   Does the organization has been providing you some extra training  
      about the QCC or not?
12.   Does the organization have been providing you any reward or not?
13.   Are you using the different problem solving tools in QCC meeting  
      or not?

**THANK YOU !**

**QUESTIONARIE (For the Management)**  
**(After running the QCC activities)**

1. Does the QCC activity have changed the workers efficiency or not?  
a. Yes                      b. No                      c. Not measured
2. What is the status of the wastage in the production after running the QCC activities?  
a. Increased              b. Decreased              c. No change
3. What is the effect of QCC activities in the worker's moral behavior?  
a. Increased              b. Decreased              c. No change
4. What kind of change you measured in the productivity of an employee from the QCC activities?  
a. Increased              b. Decreased              c. No change
5. Does the QCC activities decrease the absenteeism rate of employees?  
a. Yes                      b. No
6. Does the QCC helps to increase the relationship between the management and the employees?  
a. Yes, it has.              b. No, it doesn't.

**THANK YOU !**