

IDENTIFYING AND DEVELOPING A QUALITY MANAGEMENT SYSTEM
FOR A SMALL ORGANIZATION

by

Muhammad Naveed Kabir

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Dr. Jerry Coomer

The Graduate School

University of Wisconsin-Stout

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The Graduate School
University of Wisconsin Stout
Menomonie, WI 54751

ABSTRACT

Kabir	Muhammad	N
(Writer) (Last Name)	(First Name)	(Middle Initial)
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The purpose of this research paper was to identify and develop a quality management system plan for a small company. In today's intense competitive business environment quality management issues have become critical to the success of any business. Every organization is trying its best to address such issues in the most efficient manner because of the utmost importance of this area. Attaining and maintaining higher standards of quality have become the priority of every competitive organization. In fact achieving and maintaining good standards of quality have played a major role behind the success of leading organizations and businesses.

Every organization is learning the importance of Quality Management and its tremendous impact on organization's reputation and goodwill. That is why all organizations are looking into how they can achieve higher standards of quality as well as keep on maintaining and improving them. As a result organizations have developed many modern techniques to attain their quality objectives. These techniques include approaches like Total Quality Management and Six Sigma. Organizations are putting a lot of emphasis on the field of quality assurance in a way that their technical experts and managers can apply these concepts in the most effective manner.

There are different approaches and techniques available that an organization can choose for initiating and implementing a quality management plan. No matter what approach an organization chooses, it always requires a deep and careful analysis of the situation to identify the quality related problems and then design a solution for such problems. Therefore in this research paper, a small size organization was studied with the intention of developing a quality management plan that management can initiate to identify the problems and develop a solution for such problems.

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CHAPTER I: INTRODUCTION

In every business customer satisfaction is number one priority. The success of every organization is a direct measure of its customer satisfaction. To attain and maintain customer satisfaction, it is critical that organization meets certain quality standards. That is why every organization in today's business world is not only trying its best to achieve certain standards of quality but how to maintain and improve on quality standards over a long period of time.

As the competition increases in business environment, every company tries its best to build its good reputation which can only be achieved by a good and consistent quality in product and/or service. All companies use different techniques and tools to improve the quality of their product and operational processes. Consequently these techniques result in

1. Lower cost of production through less inventory and scrap
2. Improved and efficient level of productivity
3. Higher customer satisfaction
4. Increase in profit

Statement of the Problem

The purpose of this study is to identify and develop a quality management system for a small organization that currently has no such system in place.

Purpose of the Study

Through this study

1. Organization will be able to determine customer satisfaction by determining and evaluating customer requirements.

2. Management will understand the importance of quality management and its impact on customer satisfaction.
3. Organization will develop ways to determine quality issues in regard to customer satisfaction.
4. Organization will have a plan for quality control.
5. Organization will also understand the importance of employee training.
6. Confirm the impact of quality plan by evaluating the results achieved.

Assumptions of the Study

Following are the assumptions made in this study

1. Employees provide honest information about the operation process.
2. All important elements are presented in observation and interview procedure
3. Organization is committed to implementing a better quality control.
4. The process operation of the organization reflects all the important elements of operational procedure of an organization.
5. Quality Management System will be applicable for any small organization of this size.

Definition of Terms

Quality. The quality of a product or service is the desirable composition of all attributes which can satisfy customer. (Willborn, 1988)

Quality. Quality is the totality of all features and characteristics that help a product to satisfy the intended need. (Kolarik, 1995)

Product. Product is set of attributes offered to a customer for fulfilling specific needs

Customer. Customer is anyone who is effected by the product or service.

(Kolarik, 1995)

Quality Management System. A Quality Management System is a system that connects all individual procedures and directs all work and workmanship in a direction so that quality objectives and customer satisfaction can be achieved.

(Willborn, 1988)

Quality Plan. A quality plan is a detailed document that describes all activities with respect to function, specification, stage in production, inspection method and decision rules (Willborn, 1988)

Quality Assurance. Quality assurance is a set of activities designed to build up confidence in customers by making sure that certain quality measures are achieved during the process of production or service. (Kolarik, 1995)

Total Quality Control. A quality management plan that focuses on each individual department and tasks to achieve a quality level that meets the customer requirement with each related aspect. (Arnold & Holler, 1995)

Limitations of the Study

Some of the limitations of the study include

1. Since the operational procedures are much simpler for this organization therefore the analysis of procedure may not apply to complicated processes.
2. Most of the employees of the organization are handicapped therefore some recommendations are made with a focus on such employees.

3. Suggestions and recommendations made in the study take into consideration the limitations of the organization and therefore do not go beyond the scope of available resources
4. Identification and observation of quality related elements is less systematic due to the limitations of the organization and lack of expertise or skilled labor.
5. Quality related data is less reliable because of the fact that organization lacks a good system for record keeping.

Methodology

The methodology that will be used for identifying and developing a Quality Control Plan include a combination of observation and interviews with selected employees. The process of operations will be observed during a typical routine work day. In order to do so observations will be made with a focus on the input, process operation and the output. Notes will be taken during the observation for significant pieces of information. Specific information about the product input, process operation and the output will be noted with a focus on related documents.

After the operational process will be analyzed in detail, it will be broken down in detailed components. The supervisor will be interviewed for getting to the details of functions at each stage. The critical areas during the process will be identified which can significantly impact the quality of output product. These areas will be analyzed in detail so that certain elements can be introduced for ensuring the achievement of quality in the output product.

During the process of observation, several components and elements will be given special attention to estimate their impact on the quality of over all process. These elements with regard to their stage in operation process are listed as follows:

Incoming material:

1. Observing the conditions of the input material.
2. Identifying the standards for acceptance of incoming material.
3. Gathering details of previous stage.
4. Identifying and analyzing related documents and their contents.
5. Observing the process of recording incoming material.
6. Classification of incoming material into certain categories

Process Operation:

1. Handling of material
2. Recording related information
3. Planning, organizing and implementing operational procedure
4. Identification of helpful equipment and tool for operation process
5. Estimating the efficiency of the operation process
6. Measurement and scaling procedure
7. Identification of specifications for standards during performance of operations

Output Product:

1. Finishing procedure for the output product
2. Inspection of output product
3. Categorizing the output product according to specific criteria
4. Packaging of output product

5. Documents for the output units for traceability of the product
6. Systematic feedback system for output product

Each of the above mentioned elements will be taken into consideration for their impact on quality control and they will be analyzed before making recommendations for the quality control plan.

Interview Process:

The interview will be conducted with the supervisor of employees. Following is a list of questions that will be asked during interviewing

1. How do you assess the quality related problems with the output product?
2. Do you keep and maintain data regarding quality related problems?
3. What is the process for getting feedback from the customers on a regular basis?
4. Do the employees get a training session on the tasks that they are expected to perform? If so, do you keep that in a specific manual?
5. Do you use a proper documentation procedure between different stages of the process operation?
6. Do the employees use a standardized procedure for their tasks? If so, is that procedure written in a manual?
7. Do the employees use standardized equipment during the performance of their tasks? If so, how do you maintain such equipment?
8. What is the procedure for inspecting the input material? Are there specifications for minimum level of acceptance?
9. How do you document the input materials?

10. Do you regularly inspect the output product? Are their specifications for output product? What is the criteria for acceptance or rejection of output product?

CHAPTER II: LITERATURE REVIEW

Quality is not a new subject, as is believed by many of us. Many of the techniques that are used today were still in practice even thousands of years ago. In the last 30 years topic of quality has become the dominating issue in almost every business. Over the time, customer preferences have shaped the field of quality.

History of Quality

Between eleventh to the eight centuries BCE, China introduced the concept of quality control in its handicrafts. Scandinavian shipbuilders were also using quality improvement techniques over the whole first two millennia BCE and the first millennium CE. By 500 BCE Greeks were using quality control methods to build their temples. By 4th century BCE India had quality measures that needed to be followed strictly in the industry of Gold while from 300 BCE to 300 CE Romans were using quality standards in most of their productions. (History of Quality, 2004)

Quality in Old Egypt Culture

In all business processes where we have measurement involved, there has to be some calibrations to a standard. This leads to a role of quality in the process. In old Egypt, a unit of measure called “cubit” was used for measuring length. One cubit was equal to the length of Pharaoh’s forearm. In all the nation all the cubit sticks were made against this standard and each builder was required to have his or her stick checked and calibrated once every full moon. Failure to comply with this regulation would result in life sentence of the builder. Such quality is still reflected in the pyramids of Egypt. (Arnold & Holler, 1995)

Quality in Rome

Many of the old buildings built of Roman empire are still standing which are thousands of years old. It is because of the fact that Romans had strict quality standards in their construction industry. If a building would collapse, it will cost the life of engineer who built it.

Quality and the Industrial Revolution

Before industrial revolution, a craftsperson would make one product at a time from beginning to end. In 1798, Eli Whitney tried to introduce the concept of mass production. Although the experiment wasn't a big success, yet it proved the idea of mass production.

Later on industry started to build its products piece by piece rather than making one product at a time. Then assembly line was introduced by Henry Ford. In this method of production, supervisor was responsible for quality instead of craft worker. As the load of work increased, an inspection department took the place of supervisor. As the productivity kept on increasing, it became difficult for inspection department to inspect each item therefore statistical techniques were introduced to ensure the quality in operations.

What is Quality?

Quality is not an absolute term. It involves many of the other characteristics of product or service. Some of these characteristics are cost, size, performance, economy of operation, warranty, appearance and reputation. All these characteristics contribute to the whole picture of quality.

Quality and customer satisfaction are critical factors for capturing and maintaining the market share. While marketing helps to recruit new customers, quality helps to satisfy the existing customers. It costs five to seven times as much to get a new customer as it does to satisfy and keep one (Struebing 1996). Spending \$1000 on quality is like spending \$5000 to \$7000 on advertising and promotion. (Levinson & Tumbelty, 1997)

When a customer is happy and satisfied, he recommends the same product to many other customers which results in free advertising. According to Sheila Kessler (1995), a lifetime customer of Minute Maid is worth \$1 million. The assumption here is that a life time customer buys the Minute Maid products throughout his/her life and recommends it to others. The same assumption concludes that a life time customer of Delta Airline is worth \$1.5 billion.

Quality in a Changing Business World

In today's business world there are many factors effecting the field of quality. Some of these include

1. Competition
2. Changing customers
3. Changing product mix
4. Product complexity
5. Higher levels of customer expectation

In past higher quality was associated with paying a higher price. In today's intense competitive business world companies have to achieve a higher quality along with a lower price. Thus if achieving a higher quality results in a higher price because of

rise in internal costs like inspection, rework, scrap etc, it might result in lose of sales.

(Juran & Gryna, 1993)

Defining Quality

From the discussion above, we can define quality in a number of ways. Some of the definitions are as follows

“Quality is the composite of all the attributes or characteristics including performance of an item or product” (Arnold & Holler, 1995)

“Quality is the total composite product and service characteristics of marketing, engineering, manufacturing, and maintenance through which the product and service in use will meet the expectation of the customer”

“Quality is the conformance to standards that represent the product’s or service’s basic characteristic, and are based on customer need or expectation”

In simple words “Quality is customer satisfaction”. Another short definition of quality can be as simple as “Fitness for use”. (Juran & Gryna, 1993)

To understand the definition of quality we start with defining the customer. A customer is anyone who is impacted by Product or service. This results in following two types of customers.

1. External Customers include ultimate users, intermediaries, merchants.
2. Internal customers include all the different departments and divisions that are directly related with product e.g. raw material or indirectly like financial budgeting etc.

The product is the output of any process and can be classified into Goods or services.

Now customer satisfaction can be achieved through following two ways.

1. Product features. The product features have a direct impact on sales volume. These features include performance, reliability, durability, ease of use, serviceability, esthetics, availability of options (expandability), reputation, accuracy, timeliness, completeness, friendliness and courtesy, reputation etc.
2. Free from deficiencies. This means that product is from errors, defects, failures and off-specification. This refers to quality of conformance. As the quality of conformance increases, it decreases the costs. Higher conformance produces higher level of customer satisfaction and less complaints.

The interrelation of Product features and freedom from deficiencies is shown by the diagram below.

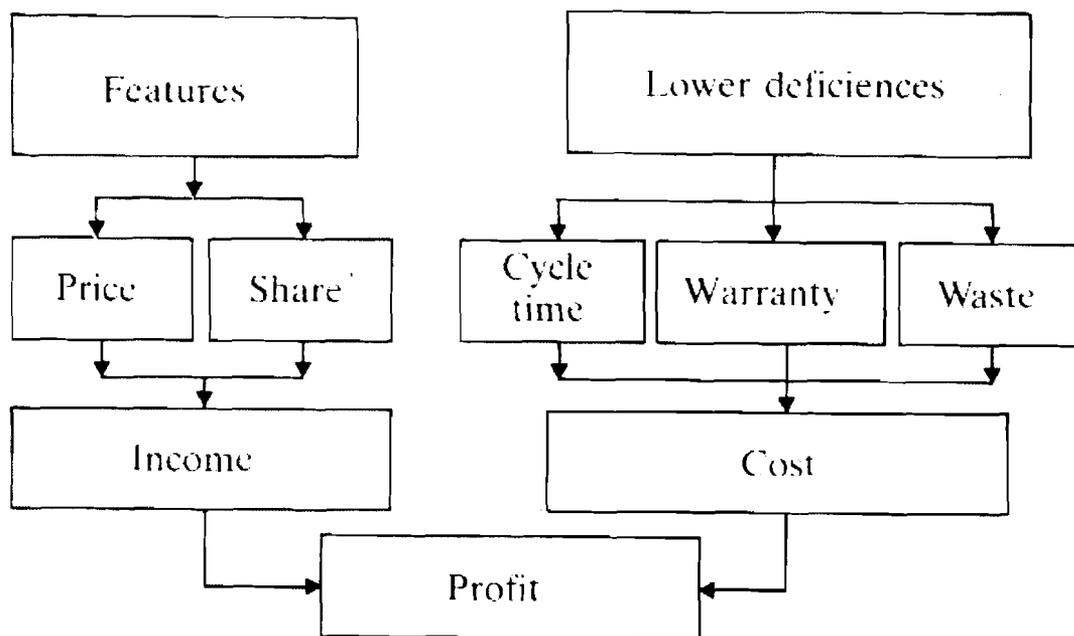


Fig 1: Product features and Freedom from deficiencies, Source: Juran Institute, Inc., 1990.

Early Philosophies about Quality

In recent years Global competition has become intense thereby causing a strive to gain excellence in quality. Therefore good quality management techniques have become more critical to every company. There are several philosophies that have gain well recognition in the field of quality. (Arnold & Holler, 1995)

Each of these philosophies is unique but they all have common concepts. A company might adopt one or another approach but companies using only one philosophy would be exceptional. Therefore it is important for quality professionals to be aware of major concepts of each different philosophy. When dealing with a particular problem, these professionals can draw from each school of thought according to the specific situation.

1. W. Edwards Deming

W. Edwards Deming (1901-93) is among the pioneers of quality field. He worked as a consultant to the U.S. War Department during World War II. Deming believed that 85 percent of the quality problems are generated by management. His philosophy focuses on improving quality through a better management. It had 14 steps as major guideline for management.

According to main highlights of this philosophy, management must create a consistent purpose for improvement of products and service. They must have a plan to become competitive and stay in business. Management must have a new philosophy with no excuse to common delays, mistakes and defects.

In the light of this philosophy, management must adopt statistical techniques for inspection rather than depending upon mass scale inspection. Rather than awarding

business on the basis of price, management must associate quality with price. Suppliers, who do not qualify with statistical evidence of quality, must be dropped. Management must locate problems in all areas like design, incoming material, composition of material, maintenance, improvement of machine, training, supervision and retraining.

Modern methods of on the job training must be adopted. The supervisor's role must be changed from bossing to coaching. Quality should be emphasized over quantity. Fear among the employees must be driven out so that each one will work effectively. Barriers among different departments must be removed. All departments like research, design, sales, and production must work together to deal with production problems.

Numerical goals should be eliminated. Management must institute a vigorous program of education and retraining. To ensure that all of the above mentioned points are implemented seriously, a structure in top management must be created which will be responsible for pushing all of the above mentioned points.

2. Joseph M. Juran

Juran has written many books on the subject of quality and he is considered as an authority in the field of quality. He established the Juran Institute in 1979 which attempts to promote the quality in all kinds of organizations. Juran believed that there are no hard and fast rules that can be applied to a situation for resolving quality problems therefore Juran philosophy of quality management is a combination of Juran's own ideas and the concepts introduced by other good quality professionals. According to his approach, one quality problem must be taken at one time in order to solve it and then a system must be put in place so that the problem doesn't happen again.

Juran Philosophy can be summarized into following three components

1. Quality Attitudes
2. Quality Solutions
3. Quality Planning and Control

Quality attitude refers to a mind-set about realizing the importance of quality in any decision. Everyone in the organization ranging from workers to top management must have a quality attitude. In order to obtain quality attitude, it is important that workers must understand that quality is both desirable and attainable. Juran talks in detail about what are the different kinds of employees in an organization and how each one of these must be approached in order to develop their quality attitude.

The second step is to identify the problems related to quality and then develop a plan to correct such problems. There are two major types of problems

1. Sporadic Problems
2. Chronic Problems

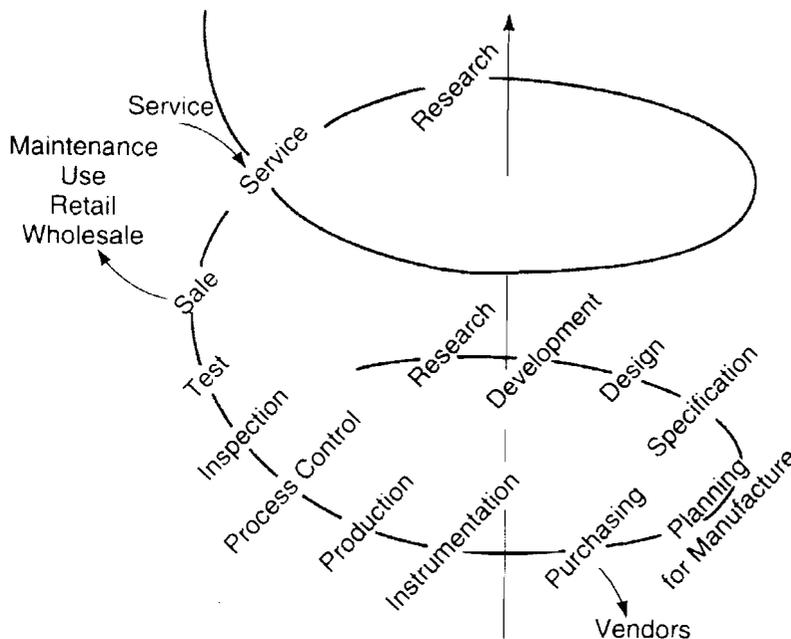
The first kind refers to dramatic deviations from the status quo while the 2nd kind refers to problems that occur over a long period of time and therefore they are not easy to solve. The chronic problems require that there must be some change in order to get them solved. Juran describe a concept to solve such problems which is called “Pareto Principle” also known as “vital few and trivial many”. Most of the problems are caused by vital few while a smaller proportion accounts for trivial many.

After the problem has been identified, Juran suggests to use “steering arm” and “diagnostic arm” in order to plan for solving these problems. The steering arm consists of employees who can provide information in following areas

- Definition of the specific aim of the improvement program
- Ideas of what can be the possible causes of the problem
- Authority to experiment
- Authority to implement the solution

The diagnostic arm include the people who can determine the causes but not the remedies of the problem. These two arms work together to identify the problems, their causes and then set up a solution to correct the problems.

The next step is to implement the plan. Implementation can be difficult because it requires a change while people are resistant to changes. Juran also gives guidelines for dealing with this resistance in an efficient manner. After this resistance has been removed, actual implementation can begin. Implementation of the plan by various departments is illustrated by Juran through following diagram:



Source: J. M. Juran. *Quality Control Handbook*, 4th ed. (New York: McGraw-Hill Book Company, 1988). Permission granted by McGraw-Hill Book Company.

This model shows progression in work through time by using the form of a spiral. The success of this plan depends upon an effective integration and co-ordination between each individual process and department. Each of the subsystem must achieve its individual goals.

Implementation is done through a transition period which involves

1. Retooling
2. Exchange of information
3. Training
4. Following progress to ensure the sequence stays on course

Depending upon how much complicated is the process, training will consume considerable amount of time. For implementing the new methods, some techniques must be used for motivational factor of the employees which will assist in a smooth implementation of the new plan. There should be sharing of information gathered by diagnostic and steering arms with different department and divisions.

After the transition has taken place, the next and final step is control to obtain quality in product or service. It includes

1. Choosing the subject of control
2. Using a unit of measure
3. Setting and resetting a standard
4. Choosing and using a type of sensor

The function of controlling is critical to standards, staying on course, and preventing change of direction. Some examples of the subjects that need to be controlled include

- Part Tolerance
- Cost
- Morale
- Corporate image

After the subject of control has been chosen, an appropriate unit of measure must be decided. Juran suggests for the use of numbers to avoid controversies or debate on issues. For example it should be specified “How poor is the poor quality?”

In order to assist with decision making, a standard must be established along with unit of measure. The standard originate from customer but they need to interpreted for each stage of the process to meet the end user requirement. These standards must have qualities like attainable, economical, applicable, consistent, understandable, stable, maintainable, legitimate, and equitable.

Sensor is needed to determine the effectiveness of implementation. It is a device that is used to sense some stimuli and convert that into some useful information. Some of the examples of most familiar sensors include

- Time clock cards
- Material requisition
- Inspector’s gauges
- Sales representatives
- Call records

Whatever sensors organization chooses to use, it must be decided and agreed upon by different departments so that their validity is not questioned. After the sensors

are chosen, actual performance can be measured as well as the tasks of developing quality attitude, quality plan setting, plan implementation and quality control.

3. Philip B. Crosby

Philip B. Crosby was the quality manager for Martin Marietta Corporation's martin Company in Orlando, Florida. He introduced the concept of Zero Defect (ZD).

The logic of Zero Defect is that quality problems need to be pursued proactively. Therefore rather than waiting for such problems to happen and then correct them, they need to be stopped. For this purpose, we need to look at the definition of defect and how it came. Defect is caused by

1. Lack of knowledge
2. Working with the wrong tools or without the proper facilities
3. Worker's inability to keep his/her attention on the work being performed

Crosby was convinced that in order to deal with the worker's error, he needed to motivate the employees toward a mind-set that would promote business ethics and quality. It will require the promotion of a constant, conscious desire to "do the job right the first time."

In order to develop such an attitude among the employees, Crosby insisted that higher management should take a direct action. This involves following five steps

1. Present a challenge
2. Back the challenge
3. Establish standards
4. Check results
5. Act in accordance with the results

The approach of the Zero Defect is independent of technology or particular quality techniques. The concept of this program is that employees perform work at the standard set by management. Therefore if management sets low standards then employees have a reason to perform poorly. Management must change its philosophy by setting a standard of zero defects while at the same time sponsor some program that enables to achieve the new goal.

Zero Defect plan include the following 14 steps

1. Management Commitment

Top level management commitment is critical to the success of ZD program. The workforce must be able to observe this commitment through the actions taken by management. A quality policy must be developed on the corporate level. Reports on quality improvement process, quality costs and conformance must be discussed in the top level meetings. Chief operations officer should make clear statements about quality in order to motivate the employees.

2. Quality improvement teams

Employees from different departments are brought together to form a team which focuses on improving the quality of different operational processes through effective coordination. This also helps for a low level motivation program.

3. Measurements

The quality measurements under taken by the company are reviewed. They should be critically analyzed for questions like “What exactly are the company’s measurements? Are such measurement working?” A quality status will help to determine such elements

by showing possible improvements that can be made, give corrective action and then record the actual improvements made.

4. Cost of quality

It refers to the place where improvements can help the company to increase its profit. There are two areas of cost of quality:

1. Price of nonconformance: It refers to all the cost that is incurred by doing things wrong.
2. Price of conformance: It refers to all the cost that is incurred by doing all the things right the first time.

The first results from a lack of quality while the 2nd is the cost of doing business. An analysis of both of these will help to realize how effective is the quality plan presently in use. Through using a dollar value assigned to cost of poor quality, management will be motivated to take action for quality control.

5. Quality awareness

This is a system through which management attempts to create an awareness about the cost of poor quality. Such communication in an effective manner is very important. This is done through improvement material like booklets, films, and posters. Sometimes company can use a slogan like “Do it right the first time” to increase the quality awareness.

Everyone in the company needs to be informed about what the company’s quality policy says and how much it costs to do the things wrong way. Company’s can also advertise about their quality policy to increase quality awareness among buyers by uplifting the company’s image.

6. Corrective action

Corrective action helps to identify and eliminate the quality problems. Quality problems that are identified through inspection, audits, or self evaluation are discussed by the employees to analyze them in detail.

7. Zero Defect Planning

Planning must be done for implementing the corrective actions to achieve Zero Defect. Zero Defect planning should be implemented by a holding a formal ceremony on a specific day in which all employees must be informed about the new plan at the same time to have the most of its impact. Selected people can work on planning for the holding of such day following some good examples of other companies.

Information about the ZD program along with its goals and objectives is provided by head of the department responsible for ZD implementation who have been trained in this area. Other people like customers, city government and representatives from unions can also make speeches.

8. Supervisors Training

Before starting to implement each step, a formal meeting should be held with managers. Managers must understand each step to the extent that they can explain it to their employees. This way all the employees will be involved in the process and they will be willing to put the efforts for an effective implementation of the program.

9. Zero Defects Day

Zero Defects Day marks a change of attitude to work with a new vision. Supervisors can do something different at this day to symbolize the beginning of new

approach. They can explain the new planning to their employees and build up confidence and motivation for working towards achieving Zero Defect.

10. Goal Setting

As soon as the measurement for cost of poor quality begins, employee should start to think about goals. The objective is to achieve ZD which everyone must understand. Goals must be chosen by a group of people. They should be put on a place in charts like format that can be seen by everyone easily. Minor goals should not be listed. Although goals should challenge the employees yet they should be achievable.

11. Error cause removal

Individual employees list or describe problems that keeps them from performing error free work. They don't have to design the solution rather just list the problems. In order to have an effective implementation of the program, employees must have the feeling that their problems and concerns are heard and addressed appropriately. Therefore the listed problems must be recognized within 24 hours. Thus employees will trust the communication for solving the problems.

12. Recognition

ZD focuses on recognizing the employees who achieve their new goals or objectives. It is important to note that this recognition should not be monetary. In order to make the recognition motivating , people should be on the social affiliation level or self esteem level. Thus they will continue to put their efforts to support the program even if they don't receive an award. People will deeply appreciate the genuine recognition.

13. Quality councils

Professionals in the field of quality and team chairpersons should be brought together to exchange their views and take necessary actions on a continuous basis for maintaining the effectiveness of the program. They can upgrade certain components to improve the program and keep updated about the exact status of the program.

14. Do it over again

Normally the program takes 12 to 18 months to install. During this time span there can be a quite a few job turnover and other changes. Therefore it is necessary to keep on revising the program through different techniques like celebrating the anniversary of ZD day. The employees should understand the concept of continuous improvement. They must be communicated that the program never ends.

4. Armand Feigenbaum:

Dr. Armand Vallin Feigenbaum introduced the concept of Total Quality Control, an approach to quality and productivity that has impacted the world markets in the U.S., Japan, and throughout the industrialized world.

Feigenbaum managed worldwide manufacturing operations and quality control for the General Electric Company for 10 years. He is the founding chairman of the International Academy for Quality and is past president of the American Society for Quality Control. He has been recognized as an important figure in the field of quality through Edward Medal and Landcaster Award for his contributions to quality and productivity.

TQM is an extensive quality improvement program which gets everyone involved. It documents the work structure in an effective and integrated manner in such a

way that everyone, companywide and plantwide, is agreed upon it. This helps to coordinate the efforts of workforce, machines and the information of the company in a very effective and practical manner while ensuring the customer satisfaction and economical costs of quality at the same time.

Many times the company's quality control department focuses on the production area. There is no doubt that quality control in production area is extensive but it is not the only area where company incurs quality costs. Feigenbaum insisted that quality has a significant impact in business. Therefore customers requirements must be met at all times starting from the initial contact with customer to installing and servicing the product.

It is not just the product that customer get in contact with but a lot of other areas of the organization. Therefore customer can feel good about the product but still dissatisfied because of a poor performance in these areas. Such areas can include shipping, records, invoices, or a number of other departments. TQM is a customer based quality improvement program therefore it focuses on all these areas in a way that customer is satisfied with everything in relation to these areas.

According to Feigenbaum quality is the total composite product and service characteristics of marketing, engineering, manufacture, and maintenance through which the product and service in use will meet the expectations of the customer. This means that customer forms an opinion about the product by more than just the product itself. The customer must be satisfied in all the areas that effect a transaction. All the areas must meet the customer requirement including marketing, engineering, purchasing, manufacturing engineering, shop operation, shipping, installation, and service.

In order to satisfy customer requirement, Feigenbaum mentions ten product and service conditions that must be met. These are as follows:

1. Specifications of dimensions and operating characteristics
2. Life and reliability objectives
3. Safety requirements
4. Relevant standards
5. Engineering, manufacturing, and quality costs
6. Production conditions under which the article is manufactured
7. Field installation, maintenance, and service objectives
8. Energy utilization and material conservation factors
9. Environmental and other side effects considerations
10. Cost of customer operation and use, and product service

The objective here is to make sure that quality will establish a proper balance between cost of the product or service and the customer value it renders.

In order to implement this concept in an effective manner, a different approach in management strategy should be adopted which focuses on achieving quality in each of the individual tasks like inspection, product design, reject troubleshooting, operation education, supplier control, statistical analysis, and reliability studies.

5. Quality Circles

Quality circles is based on a concept that works in conjunction with TQC concepts. The idea is “Who better to identify the problems than people working the machines?” Therefore quality circles rely on employees and work force to identify and solve the quality problems that exist in the work place.

A quality circle is a group of employees and their supervisors from different departments who meet on a regular basis to co-ordinate and exchange information in relation to the problems that exist in the work place. They study these problems and work together to develop plans and techniques in order to eliminate the problems permanently while aiming to increase the productivity and quality of the output.

While forming quality circles, fourteen points should be considered as their characteristics which are as follows:

1. Quality circles are normally small in size ranging from 4 to 15 members.
2. The members come from the same area.
3. The supervisor comes from the same area as the members.
4. Supervisors are usually the leaders of the circle but it may not be the case always.
5. The participation is totally voluntary which means that member have the choice to join the circle or not, quit or rejoin.
6. Normally the circles meet once a week, on company time, with pay.
7. Circles meet in a special room away from work area.
8. Circle members receive a special training about the rules of running a quality circle in an effective manner. Such training can include running a meeting, management presentation, group problem solving, brainstorming, flowcharts, Pareto analysis, cause-and-effect diagram.
9. Circle members are the one who select a problem to discuss and solve.
10. Circle members collect all information about the problem, analyze the information and develop solutions.

11. Circle members can request assistance from technical specialists and management whenever they need it.
12. An advisor who is not a circle member provides his/her advice to the quality circle.
13. Management presentation are given to those managers and technical specialists who would normally make the decision on a proposal.
14. Circles can exist as long as the members wish to meet. They can inactivate themselves or reactivate; they can meet for one year or one month.

All of the fourteen points may not apply to one particular situation. A company with very small size quality circle of one or two people might need to apply just a few of these points while a large company with a numerous number of quality circles might need to apply all of these fourteen points.

It is important to note that in order for these quality circles to perform effectively, Maslow's Hierarchy of Needs must be met within the company. Employees should feel secure about their jobs while bringing in information about the quality problems and ideas to solve these problems.

This is an ongoing philosophy of improving quality. Therefore a cultural change in the organization must be done with careful planning otherwise poor labor/management relations might result with this process.

CHAPTER III: METHODOLOGY

Introduction

The methodology used for identifying and developing a Quality Control Plan included a combination of observation and interviews with selected employees. The process of operations was observed during a typical routine work day. In order to observe the routine work, specific observations were made regarding

- a. Input
- b. Process Operation
- c. Output

Notes were taken during the observation for significant pieces of information. Specific information about the product input, process operation and the output was noted with a focus on related documents.

After the operational process was analyzed in detail, it was documented in detail. The supervisor was interviewed to get the details of functions at each stage. The critical areas, which could significantly impact the quality of output product, were identified during the process. These areas were analyzed in detail so that certain elements could be introduced for ensuring the achievement of quality in the output product.

Observation Process:

During the process of observation, several components and elements were given attention to estimate their impact on the quality of over all process. These elements with regard to their stage in operation process are listed as follows:

Input:

1. Observing the conditions of the input material.

2. Identifying the standards for acceptance of incoming material.
3. Gathering details of previous stage.
4. Identifying and analyzing related documents and their contents.
5. Observing the process of recording incoming material.
6. Classification of incoming material into certain categories

Process Operation:

8. Handling of material
9. Recording related information
10. Planning, organizing and implementing operational procedure
11. Identification of helpful equipment and tool for operation process
12. Estimating the efficiency of the operation process
13. Measurement and scaling procedure
14. Identification of specifications for standards during performance of operations

Output:

7. Finishing procedure for the output product
8. Inspection of output product
9. Categorizing the output product according to specific criteria
10. Packaging of output product
11. Documents for the output units for traceability of the product
12. Systematic feedback system for output product

Each of the above mentioned elements were taken into consideration for their impact on quality control and were analyzed before making recommendations for the quality control plan. However there are some limitations to the above mentioned

elements. The identification and observation of these elements is less systematic due to the limitations of the organization and lack of expertise or skilled labor. As a result the organization lacks an effective and systematic record keeping system.

Interviewing Process:

The interview was conducted with the supervisor of employees. Following is a list of questions that were asked during interviewing

1. How do you assess the quality related problems with the output product?
2. Do you keep and maintain data regarding quality related problems?
3. What is the process for getting feedback from the customers on a regular basis?
4. Do the employees get a training session on the tasks that they are expected to perform? If so, do you keep that in a specific manual?
5. Do you use a proper documentation procedure between different stages of the process operation?
6. Do the employees use a standardized procedure for their tasks? If so, is that procedure written in a manual?
7. Do the employees use standardized equipment during the performance of their tasks? If so, how do you maintain such equipment?
8. What is the procedure for inspecting the input material? Are there specifications for minimum level of acceptance?
9. How do you document the input materials?
10. Do you regularly inspect the output product? Are their specifications for output product? What is the criteria for acceptance or rejection of output product?

CHAPTER IV: RESULTS

The results of the study were finally compiled. The purpose of this study was to identify and develop a quality management system for a small size organization. Through the process of observation and interviewing, significant pieces of information were listed that could lead to useful conclusions for the purpose of developing a quality management plan.

Task Analysis:

Different elements of the operation process were viewed in light of quality control issues to see if they fulfill criteria to achieve better quality standard. Elements that played a crucial role in quality management, were given special attention. The operation process was broken down into three major categories

1. Input
2. Process
3. Output

Each of these stages were analyzed in detail. Factors that contributed to quality related problems, were located. The interviewing process helped to get to the details of the performance of different tasks. Interviewing together with the observation enabled to provide specific resulting comments. The following example illustrates the three stages as follows:

1. Input: Employee takes a box that needs to be categorized as re-useable or scrape.
2. Process: Employee inspects the outer body, corners and folding wings condition to judge if box can be re-used or it should be put in scrap.

3. Output: The employee puts the box into the appropriate category after minor adjustments and then deliver it to the customer organization.

In this operation, the employee does not record the information about input material

and use a document before transferring to the operational process. During the operational process, the employee does not use proper equipment like scaling equipment to check if the dimensions are still accurate for re-use. Also employee uses his/her personal judgment rather than a defined criteria for the purpose of categorizing it either re-useable or scrap. While putting the box into delivery box, the product is not recorded into a proper documentation. Such other findings are listed below:

Findings of the study:

The important findings of the study are as follows:

1. Currently the organization doesn't have a quality management system or philosophy.
2. Operational procedures are not streamlined according to a systematic manner.
3. The organization doesn't have a specified criteria for inspection of input materials
4. The organization doesn't have proper documentation between different stages of the operation process.
5. Employees do not get a sufficient level of training before starting on a task.
6. Employees use a personal judgment during the operation process rather than standardized equipment or a standardized procedure.
7. The organization does not have a proper system in place to get the feedback on output product.

8. The organization does not have specifications that should be taken into account while performing the operational procedure.
9. There is a lack of record keeping that could have been helpful for locating certain product, employee or other variables for the purpose of quality related inquiries.
10. The output product is not inspected according to a recognized process of inspection like sampling before delivering to the customer.

CHAPTER V: DISCUSSION

This study was done by analyzing the operational procedures of the organization in light of quality control elements. The analysis gave a good perspective into different areas that can influence the quality of operational procedures. Through the review of literature, a connection could be made possible between the existing situation and the ideal environment for controlling quality of the operations and output product. Although the operational procedures of the organization were quite simple, they gave a perspective of all important elements that are involved in operations of any organization. In fact the simplicity of the operations made it possible to study the whole operation rather than one module or stage during the operation.

Recommendations

In light of this study the major recommendations for a good quality control plan are:

1. Management needs to identify and define a quality philosophy in each area of the organization.
2. Management should take an initiative to streamline the operational functions after developing their philosophy about quality management.
3. Each area of operation must be analyzed to identify the elements that can impact quality of operations.
4. A feedback system must be established to identify and record non-conformance of the product.
5. The information for non-conformance must be analyzed and documented to be used for tracking the causes of non-conformance of the product.

6. Proper documents should be developed and attached to each unit of product that can help trace related items during the operations.
7. A minimum acceptance criteria or standard should be developed for input materials.
8. Employee should use scaling and other standard procedures during the operations to ensure certain specifications as a standard.
9. The work load should be divided into equal units of production.
10. Supervisors and employees should have periodic meetings for analyzing performance and improving the quality control.
11. Management should identify minimum standards for output product in their written philosophy.
12. The output product must be checked on a periodic basis by sampling the output units.
13. Certain labels should be placed on output units in order to trace them back if non-conformance is discovered later.
14. Employees should be given a brief training session related to the concepts of quality measures in connection with their operational activities.

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