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Abstract: Today, customers' satisfaction is the critical key for success; not only to give services, but also to satisfy customers needs. This paper presents brief steps for an environmental laboratory to satisfy their customers by increasing quality service. Providing poor quality will hurt profit. Achieving customer satisfaction can be done through 3 steps. A manager should master TQM. Thus, this paper concludes that quality service by implementing TQM does not work only in the industry but also in the environmental laboratory.

**Customers Satisfaction in the Environmental
Laboratory**

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**CUSTOMERS SATISFACTION
IN THE ENVIRONMENTAL LABORATORY**

**ENGINEERING MANAGEMENT
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**Presented To
Prof. Deckro D.**

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CUSTOMER SATISFACTION in THE ENVIRONMENTAL LABORATORY

Introduction

Today business, customer satisfaction is the critical key for success. Not only to give services, but also to satisfy customers needs.

For one and a half year, I worked in the laboratory, RZA-AGRA, Inc., Portland. The company was doing well at that time. The company had a small chemical laboratory for in house and outside people. We were testing ground water, air, and soil samples with following test: TPH 418.1, TPH 601/602, TPH-D 6015 and PH. These test were determining the petroleum, gasoline, and diesel contamination. The machine we were used was gas chromatography and infrared spectrophotometer.

We often had problems to turn the report result not in time because:

- the supply came late
- the solvent contaminated
- the machine was broken

One time we had unusual problem. There was a sample we tested, the result was "0". But our customer wanted the value to be changed as a "non detected". According to the customer, there is no difference between "0" and "non-detected" value. As a matter of fact, "non-detected" means the machine was not able to detect that compound. For "0"

value means the compound was not there. Our manager had an argument with that customer who was a project manager.

From the problems I stated above, I came up with an idea to write this paper about Customer Satisfaction in Environmental Laboratory. In order to satisfy the customers, we need to improve quality in the laboratory.

Do they need to increase quality?

During the last decade many companies have expanded considerable effort to improve the quality of products. Their goal has been to reduce costs and improve profits. By urging people to suggest ways of improving their work methods, managers hope to reduce inspection time, reworking time and rejected rates. Instead of spending money to inspect, rework, or scrap a rejected product, some companies have invested in quality circles. Ideally, the quality circle will develop ways to improve product quality and find ways to save money. But this quality does not work only for industry companies, but also it works in the field of services, such as in a laboratory services. Unfortunately, quality improvement offers little opportunity for cost reduction. On the other hand, the benefit of errorless service are considerable.

Quality offers little opportunity for cost reduction. In order to get a precise result in a testing, we need:

- high purity of solvent
- longer time to precise measurement
- high detection machine

All those will cost more money.

Industries rely on machines to guarantee product quality. In the laboratory service, the efforts involve machines, people and methods. For example, in RZA-AGRA laboratory, one of the gas chromatography machine often did not give the peak of diesel compound in the chromatogram. The reason of this problem was the machine was not good enough to detect heavy hydrocarbon compound, diesel. To determine quality in the laboratory service, It is necessary to include:

- Time
- Completeness
- Accessibility and convenience
- Courtesy
- Accuracy
- Responsiveness

Time: we need to consider how long we have to keep the samples extraction, hydrocarbon compounds are easily to evaporate. The sooner you extract the samples the better you get the result. And also we need to consider that how long we will distribute the report after extraction.

Completeness: we need to let the machine run completely for one samples sometimes we might see some more peaks at the end of a chromatogram.

Convenience: computer will allow us to work faster and easier, for example, to log in samples and do standard data sheet everyday.

Courtesy: front line employee need to greet every customer who brings samples.

Accuracy: 3 sources might effect the data of samples, they are the technician who will wash the glasses, the machine condition and the chemists who does the testing.

Responsiveness: the quality of laboratory services will depend on how well the chemists be able to response the questions about contamination samples.

After determining quality, what quality really means? Why don't the environmental laboratory services increase quality?

The quality improvement actually originated in both The United States and Japan prior to world war II, Americans continued to improve the concepts of manufacturing productivity improvement and after world war II, faced with overwhelming demand for goods and services, Americans concentrated on producing quantity, not quality. However, after world war II, American quality guru, W. Edwards Deming and Joseph Juran went to Japan and began teaching the American quality techniques that persued this idea. Simply put, quality improvement became the vision for everyone in Japan. But the change in Japanese quality took a long period of time.

Customer Satisfaction is Part of TQM

In the early 1980's though, The United State began importing Japanese quality methodology, called TQC, and as TQM. In 1987, the United States government began to recognized quality in U.S. company with the Malcolm Baldrige National Quality Award.

In this time, many American industry are trying to implement TQM to improve quality product and service above those of their competitors. What is TQM? TQM is a system involves all employees and constituets fundamental change in the way an organization is measured and managed. TQM focuses on continuous improvement to meet customer satisfaction. According to Brocka and Brocka, DOD give the definition of TQM is both a philosophy and a set of guiding principles that represent the foundation of a continuously improving organization. TQM is the application of quantitative methods and human resources to improve the material and services supplied to an organization, all the process within the organization, and the degree which the needs of the customer are met, now and in the future. TQM is only for good company beause managerially demanding quite complex in implementation and disruptive to the business as it is presently run. But the rewards are high. And TQM can make good companies profitable.

Customer Needs, Customer Satisfaction

Before implementing TQM, we need to know the key ingredients of TQM. From the studies, they are:

1. Leadership
2. Vision

3. Customer satisfaction
4. High expectations
5. Spirit of continuous improvement
6. Success depends on: participation, empowerment, training
7. Integrated process
8. Statistical quality tools

From the lists above, the primary consideration of TQM is customer satisfaction. If we can fulfill the customer needs, the customer will satisfy.

Each process in the organization is the customer of the proceeding process. These are the internal customers. In the laboratory, the internal customer are: the technician, the front employee, and the supplier. If each internal customer satisfies the next internal customer while focusing on external customer satisfaction, the ultimate customer-the external customer- will be satisfied. If the technician does his job well, the chemist will be happy and if the machine and the solvent are fine, the proces of testing goes smoothly.

There are 3 steps to assess customer satisfaction:

- Identifying the customers
- Understanding customers' requirements
- Establishment of measurements to determine how well these requirement are being met

1. Identifying the customers

-Mostly engineer, they need to test the waste treatment and control facilities prior to construction.

-Family , they usually want to test their drinking water, to find out the percentage of mineral especially chlorine.

2. Understanding Customers' Requirements

Understanding customer requirements is the process of determining what our customers want and need, both now and in the future. Successful organizations have come to realize that the most effective way to establish customers use their services. We all need to walk in our customers' shoes every so often to truly gain their perspective on the work we do. And once we think we know what our customers want, we need to confirm our conclusions with them. And base on Department of Environmental Quality (DEQ). DEQ has their own regulation for every test. For instance, DEQ allows to keep hydrocarbon samples for about 2 weeks after sampling. After 2 weeks, we can not extract the samples anymore because most of the compound will evaporate.

In the laboratory, customers want their sample to be extracted as soon as possible before the compound evaporates.

3. Establishment of measurements to determine how well these requirements are being met

There is simple way to learn about customer satisfaction. Ask customers about their feelings, ask them regularly, track the changes, and measure the progress. A

successful survey begins with a good questionnaire. The result of questionnaire will provide the measurement of how well these requirements are being met

Satisfaction measurement may be taken daily, weekly, monthly, or annually. Everything depends upon testing frequency and the speed with which the laboratory can modify its quality services.

The survey must result in tangible action. A stack of questionnaire is only a pile of paper. Merely counting them is not enough. They must be studied in detail before they can return on investment. Once the survey results are collated, they must be analyzed. How does management know whether 20 percent unsatisfied customers means 20 percent lost customers or whether only a proportion of them have deserted the laboratory? How many of the 20 percent dissatisfied customers will also speak badly of the laboratory? To answer this type of question, buying behavior must be examined and the effect of word of mouth measured. Only then can management begin to draw informed conclusions.

Research has shown that among the dissatisfied, there are always about 15 percent who would have been impossible to satisfy under any circumstances. If the total dissatisfaction rate is 20 percent, this means that only 3 percent ($15\% \text{ of } 20\% = 3\%$) of the client base is irretrievably lost. Finally, management may choose to identify a number of faithful customers. Interviews with faithful customers will provide data vital to analyzing the attitude of the dissatisfied.

Surveys are not the only means by which to measure customer satisfaction. Complaint or compliment letters can also become quality management tools. Although complaint and compliment letters add a touch of detail that no survey can cover, they do

not provide a basis for sound statistical analysis.

The service of chemical supplier

The quality of purchased materials/ solvent is critical to the quality of a laboratory. It is important for the laboratory to purchase materials/ solvent from a supplier who adopts quality improvement also.

The chemists should like what they are doing

This has to do with relation between manager and employees. If employees, chemists, are happy with their environment, they will like their job. And the result of their work would satisfy their customers. In order for the chemists to be happy, a manager a manager should master the Five Key Total Quality Managerial Competencies.

According to Schmidt, they are:

- Developing relationships of openness and trust
- Building collaboration and teamwork
- Managing by fact
- Supporting results through recognition and rewards
- Creating a learning and continuously improving organization

Developing Relationship of Openness and Trust

Openness is the willingness to advocate what you believe is right without fear of

the consequences. Trust is conditioned by the behaviors of others and requires reliance on the integrity, ability, and character of the people. To build openness and trust among the employees is communication. A manager should be able to speak clearly and consistently. Employees work more productively when they have relevant information about their company and its goal, know their jobs and performance goals. Employees prefer to receive this kind of information from their immediate manager and they want to know from their manager that their efforts are appreciated. A manager should spend time in the work area, observing, listening and soliciting feedback on a regular basis.

Building Collaboration and Teamwork

A manager should encourage their employees to participate in problem solving and quality improvement activities. By doing this, a manager builds a good teamwork. Building a good teamwork create a comfortable environmental in the work place. Employees will have more fun to go to work because they are working together to achieve the same goal.

Managing by Fact

There are 5 ways to achieve these goal:

- Use the tools and process of quality, for example, fishbone diagrams, checksheets, control charts, histograms, pareto charts, run charts and scatter diagrams.
- Find the root causes for problems, by keep asking "Why?" is powerful tool

- Set measurements for process control and defect prevention by measuring the checkpoints in a work process
- Set measurable goals based on customer requirements by understanding of what customer desires. How will the laboratory services be used? How are we perceived relative to our competitors?
- Document work process, this could be done by using flow chart of a work process. Flowcharts are helpful for identifying deviations between the actual and ideal paths of any services.

Supporting Results Through Recognition and Rewards

Recognizing and rewarding people is a vital feature of TQM. These profoundly affects their motivation and job satisfaction. Recognition is the act of acknowledging, approving, or appreciating an activity or a service. Rewards is the direct delivery of money or something of financial value.

There are 2 ways to use recognition and rewards:

- Celebration: congratulation notes, team events
- Cash awards and significant prizes

A manager should deliver their recognition in a personal and honest manner that is appropriate to the individual.

Creating a Learning and Continuously Improving Organization

The best support for continuous improvement is an organization of people who

give a high priority to learning. Individuals and teams will learn from both their accomplishments and their mistakes. There are 5 things a manager should do:

- Encourage employees to learn from mistakes
- Identify, catalog, and publish organizational learning resources
- Make everyone aware of core competencies
- Use "Plan-Do-Check-Act" as a learning tool
- Treat training and learning as a required investment in human assets

One of Deming's key rules is: "Find problems. It is management's job to work continually on the system."

Conclusion

This paper presents a brief steps for an environmental laboratory to satisfy their customers by increasing quality service. Providing poor quality will hurt profit.

Achieving customer satisfaction through 3 steps. And a manager should master Total Quality Managerial.

Thus, this paper provides informations people that quality service by implementing TQM does not work only in the industry company, but also that works in the environmental laboratory.

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