# THE IMPLEMENTATION OF QUALITY COST AS A PART OF TOTAL QUALITY MANAGEMENT IN PT. KUSUMATEX

**A THESIS**

**Presented as Partial Fulfilment of The Requirements**
**To Obtain the Bachelor Degree in Accounting Department**


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**A BACHELOR DEGREE THESIS**

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Yogyakarta, September 16, 2004

Ginda Rahmita Sari

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# ABSTRACT

Ginda Rahmita Sari (2004). The implementation of Quality Cost in Textile Company. A case study at PT. Kusumatex. Yogyakarta: Accounting Department, International Program. Faculty of Economics, Islamic University of Indonesia.

Quality cost is one of many tools of Total Quality Management. It is used by management as a denominator of their performance. Quality cost programs provide warning against oncoming, dangerous financial situation. Quality cost programs lend credence to management's commitment of quality.

PT. Kusumatex is considered as one of many middle class companies in Yogya that has quality cost programs as a part of their Total Quality Management program in order to maintain their performance and to be able to compete with other companies. Based on this reason the researcher has chosen the company as the object of the research.

Based on the result that has been found by the researcher, the researcher came to the conclusion that the quality cost programs which are implemented by the company is taken from the traditional point of view. The performances of the company regarding the quality cost programs that have been implemented, was quite exemplary. The quality cost programs have been able reaching the optimal value.

Whether the researcher's finding is considered relatively positive, the researcher still has some suggestion for the company. There should be some improvements for the form of the quality cost report. The company needs to identify the element of the quality cost in order to have better comprehension toward which activity that provides added value and activity that has no value and is therefore needed to be eliminated. The company should consider developing the program into total quality, which is zero defect approach. Total quality will provides more benefit for the company for long-term goal.

# CHAPTER I

# INTRODUCTION

## 1.1 STUDY BACKGROUND

Indonesia today must face the globalization that lead us to a free market. There are no physical boundaries for any economic activity as in the past. That brings us to a tighter competition as one of the consequences. Indonesian industry must combat this stiff competition not only from domestic but also from foreign industry with international capacity.

In order to survive, a company must understand well about the market. The most essential in understanding the market is to answer what kinds of products and services that the market prefer and how to maintain profit while providing product and service with such requirement.

The market today is very critical in assessing a product or service especially in terms of its quality. Products that are spread in the market vary in price or quality. Customers have the freedom to choose any kind of products which they prefer that give them economic value.

Economic value is not only determined from products or services with lower price but also from the length of time of usefulness and utility. Products and services with good quality and optimum price are not only able to provide longer time of usefulness but also more utlity which is considered as their economic value. To win the competition, an industry must be able to produce products and

services that give the customers more economic value than other competitive product.

History has shown us the fact of the importance in understanding the market. Before the world war two, the market in Japan only considered products and services that gave low price. After the world war two they faced a different market need. The industries in Japan almost collapsed. The market asked for products with low price but higher quality. A miracle arrive along with the visit of W. Edwards Deming in 1950 and Joseph M. Juran in 1954. they introduced Japan with Total Quality Management concept that give them the tool to provide the market need.

One of many tools used and as a part as Total Quality Management is called Quality Cost. It is the economic common denominator that forms the basic data for Total Quality Management. When quality cost are too great, it is a sign of management ineffectiveness, which can affect the organizations competitive position. A quality cost program provides warning against on oming, dangerous financial situations.

Quality cost are defined as those cost associated with the nonachievement of product or service quality as defined by the requirements establish ed by the organization and its contracts with customer society, simply stated, it is the cost or poor products or services.

There are four primary categories of quality cost:

1. Preventive cost

Cost of all activities that is utilized to prevent the recurrence of the same or similar failures in other products or services.

2. Appraisal cost

   All cost incurred in the planned conducted by product or service appraisal to determine compliance to requirements.

3. Internal failure cost

   All cost required to be evaluated, disposed of, and either correct or replace nonconforming products or services to prior delivery to the customer and also to correct or replace incorrect or incomplete product or service description (documentation).

4. External failure cost

   All cost incurred due to actual or suspected nonconforming product or service after delivery to the customer.

Quality cost is important for the following reasons:

1. Cost of quality may appear in a very large amount.
2. Many companies are unable to detect the exact number
3. Cost of quality appears from the suppliers, production processes until in the hand of the customer

Realizing the importance of the quality cost impact to a company, the researcher then attemps to observe PT. Kusumatex. Furthermore it is considered as an interesting case because this company as a middle cla s textile producer must optimize their operation in order to survive and compete with other

companies. Therefore the researcher has interested to find out whether the quality program applied in PT. Kusumatex able to support their operation.

Realizing the importance of quality cost in a company, the researcher tries to arrange the research and entitled this thesis as **"The Implementation of Quality Cost as a Part of Total Quality Management in PT. Kusumatex"**.

## 1.2 PROBLEM IDENTIFICATION

PT. Kusumatex is a textile company that produces their product with certain quality. In order to maintain the quality of the product, the company implements some quality control activities. However their quality control activities are not separated their activity into quality cost element, hence the company does not recognize whether the cost of quality is optimum

## 1.3 PROBLEM FORMULATION

Based on the explanation of the study background above, the problems can be stated as:

1. Is there any quality program in the company?
2. If there is a quality program in the company, how is it affecting the cost?
3. Is the quality program implemented optimally?

## 1.4 LIMITATION OF RESEARCH AREA

In this thesis, the researcher limit the research area on cost related to fabric and the production process that affects cost of quality according to the monthly data in three years. The analysis is limited in the form of mathematical equation.

## 1.5 RESEARCH OBJECTIVES

The objectives of this research are:

1. Implementing quality cost in order to reduce the cost of quality and to increase the quality.
2. Giving a recommendation for the management of the benefit of Quality Cost for their company.

## 1.6 RESEARCH CONTRIBUTION

1. The company ; the result can be used as a consideration to improve the performance of the company
2. The researcher; she is able to implement directly the theory that had been given in the year of study

## 1.7 DEFINITION OF TERMS

1. Quality: a quality product or service meets or exceeds customer expectations at a competitive price they are willing to pay
2. Total Quality Management: TQM is the unyielding and continually improving effort by everyone in the firm to understand, meet and exceed the expectations of the customers

3. Quality Cost: Cost of activities associated with the identification, repair, and rectification of poor quality and opportunity cost from loss production time and sales as a result of poor quality

## 1.8 RESEARCH METHOD

1 Type of Research Method

The research method conducted here is a descriptive research utilizing qualitative and quantitative analysis

2. Research Subject

The subject of this research is PT. Kusumatex

3. Research Setting

This study takes place at PT. Kusumatex located in Mangkuyudan, Jogjakarta

4. The Source of Data

4.1 General Data

a. Company profile
b. Organizational structure
c. Production process

4.2 Specific Data

a. Activities that cause cost
b. Cost of quality element
c. Quality cost for each group of quality cost for the last two years

5. Data Collection Method

5.1 Literature Method:

This method is used to get an understanding of TQM, more specific ally on the Quality Cost and other theories related to the topic

5.2 Observation and interview

This method is used to get a comprehension about the condition of the company

6. technique of data analysis

The technique used to analize the data in this ti esis is non-linear regression. The non-linear regression is used to analyze the relation among data element and to find the optimal value.

## 1.9 THESIS CONTENTS

CHAPTER I: INTRODUCTION

This chapter discusses about study background,problem identification, problem formulation, limitation of research area, research objectives, research contribution, definition of terms, research methods and thesis content.

CHAPTER II: REVIEW OF RELATED LITERATURE

This chapter's contains theoritical review and theoritical framework. The discussion are about quality concept, basic element affecting quality, TQM concept, quality cost concept, quality cost behavior and quality cost report system.

CHAPTER III: COMPANY PROFILE

This chapter discusses about the company profile, organization structure, and production process.

CHAPTER IV: RESEARCH METHOD, FINDINGS AND DISCUSSION

This chapter discusses about the process of quality cost implementation program on the company by identifying the activities of quality control and identify costs included as quality cost.

CHAPTER V: CONCLUSION

This chapter concludes the result or research and gives suggestion based on the chapter reviewed.

# CHAPTER II

# LITERATURE REVIEW

## 2.1 Definitions of Quality

People deal with the issue of quality in all aspects of their lives. Perceived quality is a major factor by which people make distinctions in the market place. Whether they articulate them openly or keep them in the back of our minds, we all apply a number of criteria before making a purchase. The extent to which a purchase meets these criteria determines its quality in their opinion.

Walter A. Shewhart, the father of modern-day statistical quality control, offered the following criticism of the transcedent view of quality (Bounds, Yorks, Ranney 1994;45):

> "dating at least from the time of Aristotle, there has been some tendency to conceive of quality as indicating the goodness of an object. The majority of advertisers appeal to the public upon the basis of the quality of product. In so doing, they implicitly assume that there is a measure of goodness which can be applied to all kinds of product, whether it be vacuum tubes, sewing machines, automobiles, grape nuts, books, cypress flooring, indiana limestones, or correspondence school courses. Such as a concept, is, however, too indifinite for practical purposes."

The word quality has multiple meanings, two of those meanings dominate the use of word (Juran, 1988:3):

1. Quality consist of those product features which meet the needs of customers and thereby provide product satisfaction
2. Quality consist of freedom from defficiencies

Quality has been defined in a number of different ways by a number of different people or organizations. Consider the following definitions (Juran, 1988:5):

- According to the literature ANSI/ASQC standard A3-1987 (draft), recognized that the word "quality" has multiple meanings adopted in the standard which is:

  "The totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs."

- The European organization for Quality Control Glossary (1981) has the following definition for quality:

  "The totality of features and characteristics of a product or service that bear on its ability to satisfy a given need N.B with manufactured products quality is mainly determined by quality of design and quality of manufacture."

- The Soviet encyclopedia defines quality as follows:

  "Quality of products, the aggregate of properties of a product determining its ability to satisfy the needs it was built to satisfy."

- Fred Smith, CEO of Federal Express, defines quality as performance to the standard expected by the customer.

Generally, two types of quality are recognized: quality of design and quality of conformance:

1. quality of design which is a function of a product's specifications.
2. quality of conformance which is a measure of how a product meets its requirements or specifications

Quality of design helps a company to determine its market. Once market is defined, quality of conformance receives the most emphasis. It is nonconformance to requirements that creates the most problems for companies. When quality experts speak of improving quality, they mean reducing the incidence of nonconformance. The product should be produced as the design specifies it; the

requirements should be followed. If the product is not good, then the design needs to be changed.

## 2.2 Definition of Total Quality Management

Total Quality Management (TQM) is an enhancement to the traditional way of doing business. It is a proven technique to guarantee survival in world-class competition. TQM is the art, or manner of handling of managing the whole to achieve excellence. Only by changing the actions of management will the culture and actions of an entire organization be transformed.

TQM is defined as both a phylosophical and a set of guiding principles that represent the foundation of a continuously improving organization. It is the application of quantitative methods and human resources to improve all processes within an organization and exceed customer needs now and in the future. TQM integrates fundamental management techniques, existing improvements efforts, and technical tools under a disciplined approach (Besterfields, 1999:1).

TQM requires six basic concepts (Besterfields, 1999:2):

1. A committed and involved management to provide long-term top-to-bottom organizational support. Management must participate in the quality program. A quality council must establish a clear vision, they must set long-term goals, and direct the program. Managers participate on quality improvement teams and also act as coaches to other teams. TQM is a continual activity that must be entrenched in the culture-it is not just a one short program. TQM must be communicated to all people.

2. An unwavering focus on the customer, both internally and externally. The key to an effective TQM program is its focus on the customer. An excellent place to start is by satisfying internal customers. Do it right the first time and every time, for customer satisfaction is the most important consideration.
3. Effective involvement and utilization of the entire work force. TQM is an organization-wide challenge that is everyone's responsibility. Changing behavior is the goal. People must come to work not only to do their jobs, but also to think how to improve their jobs. People must be empowered at the lowest possible level to perform processes in an optimum manner.
4. Continuous improvement of the business and production process. There must be a continual striving to improve all business and production processes.
5. Treating suppliers as partners. The supplier is very essential part of success therefore the supplier quality must be outstanding. Both parties have as much to gain or to lose based on the success or failure of product or service. The focus should be on quality and lifecycle costs rather than price. Supplier should be few in number so that true partnering can occur.
6. Establish performance measures for the processes. The measurement should be posted to everyone to see. Quantitative data are necessary to measure the continuous quality improvement activity.

The purpose of TQM is to provide a quality product to customers, which will in turn, increase productivity and lower cost. With a higher quality product

and lower price, competitive position in the marketplace will be enhanced. This series of events will allow the organization to achieve the objectives of profit and growth with greater ease.

Recent evidence shows that more and more corporations are recognizing the importance and necessity of quality improvement if they are to survive domestic and worldwide competition. Quality improvements are not limited to the conformance of the product to specifications; it also involves the ingerent quality in the design of the system. The prevention of product and process problems is a more desirable objectives than taking corrective action after the product is manufactured or a service rendered. Therefore TQM provide the tools that any organization needs for quality improvements of their products or service. In order to achieve quality improvement, TQM has several tools to support quality improvement, one of them is quality cost.

## 2.3 Definition of Quality Cost

Quality costs are defined as those costs associated with the nonachievement of product or service quality as defined by the requirements established by the organization and its contracts with customer and society. Simply stated, it is the cost of poor products or service (Besterfields 1999:142).

Quality costs are used by management in its pursuit of quality improvement, customer satisfaction, market share, and profit enhancement. It is the economic common denominator that forms the basic data for TQM. When quality costs are too great, it is a sign of management ineffectiveness, which can

affect the organization's competitive position. A quality cost program provides warnings against oncoming, dangerous financial situations.

A quality cost program lends credence to management's commitment to quality. Arguments for quality improvement are stronger when the quality costs show a need. The program also provides cost justification for corrective action. All costs associated with poor quality and its correction are integrated into one system to enhance the quality management function. Quality improvement is synonymous with a reduction in the cost of poor quality (Besterfields 1999:142).

One of the principal advantages of the program is the identification of hidden and buried cost in all functional areas. Quality costs in marketing, purchasing, and design are brought to the forefront by the system. When senior management personnels have all the facts of hidden and buried costs, they will demand a quality cost program.

2.3.1 Categories of Quality Cost

Quality costs can be classified into four categories: prevention costs, appraisal costs, internal failure costs, and external failure costs. Because things may go wrong, a company incurs prevention and appraisal costs (control costs). When things do go wrong, a company experiences failure costs.

1. PREVENTIVE COST CATEGORY

The experience gained from the identification and elimination of specific causes of failure and their costs is utilized to prevent the recurrence of the same or similar failures in other products or services. Prevention is achieved by examining

the total of such experience and developing specific activities for incorporation into the basic management system that will make it difficult or impossible for the same errors or failures to occur again. The prevention costs of poor quality have been defined to include the cost of all activities specifically designed for this purpose. Each activity may involve personnel from one or many departments. No attempt is made to define appropriate departments, because each organization is organized differently. Examples of prevention costs are quality engineering, quality training programs, quality planning, quality reporting, supplier evaluations, quality audits, quality circles, and design reviews.

2. APPRAISAL COST CATEGORY

The first responsibility of quality management is assurance of the acceptability of product or service as delivered to customers. This category has the responsibility for evaluating a product or service at sequential stages, from design to first delivery and throughout the production process, to determine its acceptability for continuation in the production or lifecycle. The frequency and spacing of these evaluations are based on a trade-off between the cost benefits of early discovery of nonconformities and the cost of the evaluations (inspections and tests) themselves. Unless perfect control can be achieved, some appraisal costs will always exist. An organization would never want the customer to be the only inspector. Thus, the appraisal cost of poor quality have been defined to include all costs incurred in the planned conduct of product or service appraisals to determine compliance to requirements. Examples include inspecting and testing raw materials, packaging inspection, supervising appraisal activities, product

acceptance, process acceptance, supplier verification, and field testing. Two of these terms require further explanation.

Product acceptance involves sampling from batches of finished goods to determine whether or not they meet an acceptable quality level; if they do the goods are accepted. Process acceptance involves sampling goods while in process to see if the process is in control and producing nondefective goods; if not, the process is shut down until corrective action can be taken. The main objective of the appraisal function is to prevent nonconforming goods from being shipped to customers.

3. INTERNAL FAILURE CATEGORY

Whenever quality appraisals are performed, the possibility exist for dicovery of a failure to meet requirements. When this happens, unscheduled and possibly unbudgeted expenses are automatically incurred. When a complete of metal parts, for example, is rejected for being oversize, the possibility for rework must be evaluated first. Then the cost of rework may be compared to the cost of scrapping the parts and completely replacing them. Finally, a disposition is made and the action is carried out. The total cost of this evaluation, disposisition, and subsequent action is an integral part of internal failure cost.

In attempting to cover all possibilities for failure to meet requiements within the internal product or service life cycle, failure cost have been defined to include basically all costs required to evaluate, dispose of, and either correct or replace nonconforming products or services prior to delivery to the customer and also to correct or replace incorrect or incomplete product or service description

(documentation). In general, this includes all the material and labor expenses that are lost or wasted due to nonconforming or otherwise unacceptable work affecting the quality of end products or service. Corrective action that is directed toward elimination of the problem in the future may be classified as prevention. Examples of internal failure costs are scrap, downtime (due to defects), reinspections, retesting, and design changes. These cost disappear if no defects exist.

4. EXTERNAL FAILURE CATEGORY

This category includes all costs incurred due to actual or suspected nonconforming product or service after delivery to the customer. These costs consist primarily of costs associated with the product or service not meeting customer or user requirements. The responsibility for these losses may lie in marketing or sales, design development, or operations. Determination of responsibility is not part of the system. It can came about only through investigation and analysis of external failure cost inputs. Examples include lost sales because of poor product performance, returns and allowances because of poor quality, warranties, repair, product liability and complaint adjustment.

2.3.2 Quality Cost Report

A quality cost reporting system is essential if an organization is serious about improving and controlling quality costs. The first and simplest step in creating such system is to report current actual quality costs. A detailed listing of actual quality cost by category can provide two important insights. First, it shows

how much is spent in each quality cost category and its financial impact on profits. Second, it shows the distribution of quality cost by category, allowing managers to assess the relative importance of each category.

The financial significance of quality costs can be assessed more easily by expressing these costs as percentage of actual sales. Exhibit 2-1, for example, reports the quality costs of Jensen Products for fiscal 1995. According to the report, quality cost represents almost 12 percent of sales. Given the rule of thumb that quality cost should be no more than about 2.5 percent, Jensen Products has ample opportunity to improve profits by decreasing quality costs. Understand, however, that reduction in costs should come through improvement of quality. Reduction of quality costs without any effort to improve quality could prove to be a disastrous strategy (Hansen and Mowen 1995:901).

A pie chart visually depicts the relative distribution of quality costs. Exhibit 2-2 provides a pie chart on the quality cost reported in Exhibit 2-1. Managers, of course, are responsible for determining both optimal level of quality and the relative amount that should be spent in each category (Hansen and Mowen 1995:902).

Exhibit 2.1

**Pie chart of quality cost element distribution**

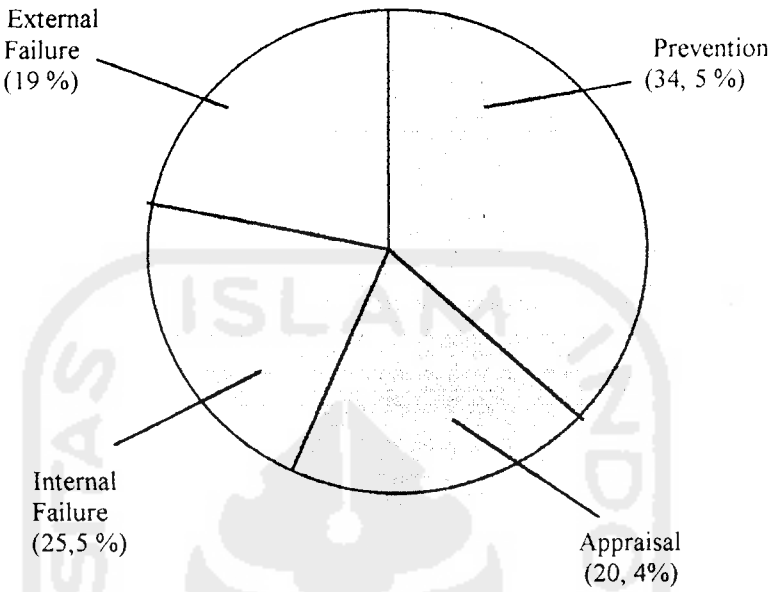
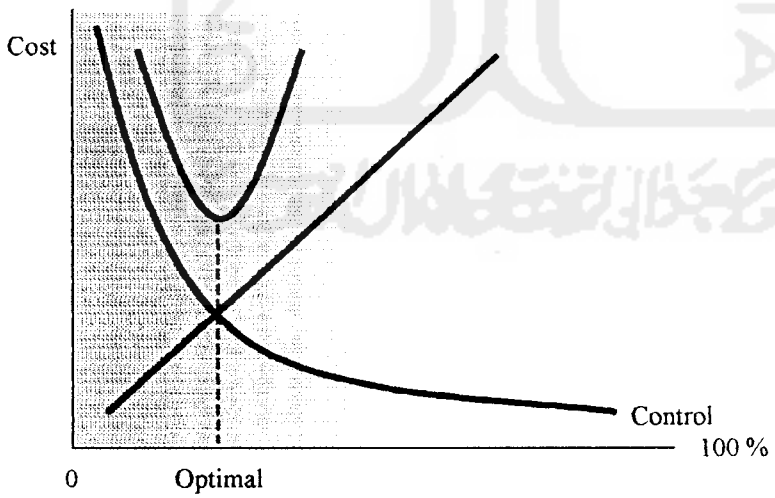



Exhibit 2.2

**Graphic of acceptable quality level**



2.3.3 Optimal Quality Cost

There are two views concerning optimal quality cost: the traditional view, calling for an acceptable quality level, and the view being adopted by world-class firm referred to as zero-defects approach.

2.3.3.1 Acceptable Quality Level

Many quality experts believe that an optimal balance exist between prevention and appraisal cost and the internal and external failure cost. As prevention and appraisal cost increase, failure cost should decrease. As long as the decrease in failure cost is greater than the corresponding increase in prevention and appraisal costs, a company should continue increasing its efforts to prevent or detect nonconforming units. Eventually a point reached at which any additional increase in this effort costs more than the corresponding reduction in failure cost. Without any change in technology, this point represents the minimum level of total quality costs. It is the optimal balance between prevention and appraisal cost and failure cost. This level of allowable defective unit is defined as the acceptable quality level .

An AQL is simply an admission that a certain number of defective products will be produced and sold. For example, the AQL may be set at 3 percent. In this case any lot of products (or production run) that has no more than 3 percent defective units will be shipped to customers. Typically, the AQL reflects the current operating status, not what is possible if a firm has an excellent quality program. As the basis for a quality standard, AQL has the same problems as

historical experience does for materials and labor usage standards: it may perpetuate past operating mistakes. The curve of AQL is shown in Exhibit 2-2

Unfortunately, AQL has additional problems. This problems are stated in these several questions:

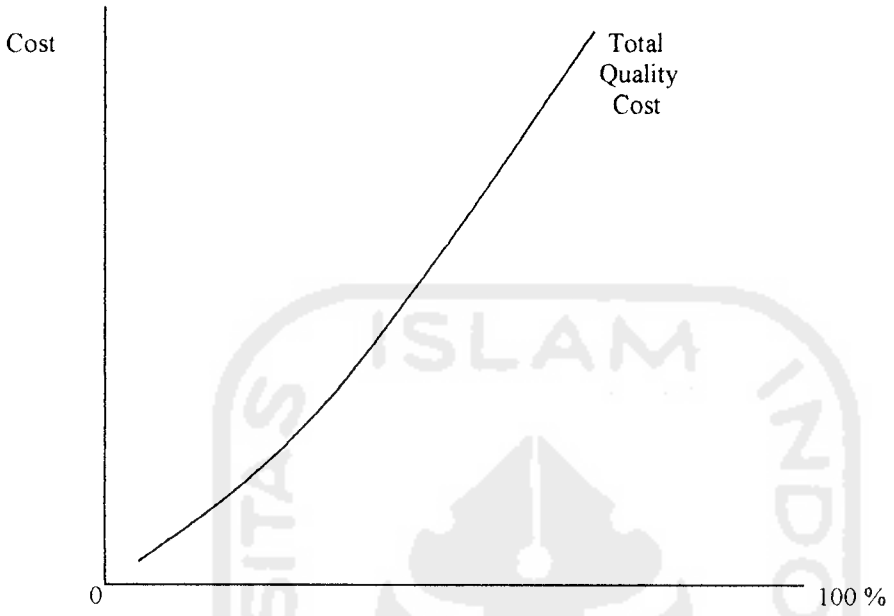
1. why plan to make a certain number of defective units?
2. why not plan instead to make the product according to its specifications?
3. is there not a matter of integrity involved here?
4. how many customer would accept a product if they knew that it was defective?
5. how many people would consult a surgeon if they knew that the surgeon planned to botch three of every one hundred operations?

2.3.3.2 The Zero-Defect Approach

Zero defect is a performance standard that calls for products and services to be produced and delivered according to requirements. It reflects a philosophy of total quality control. Admittedly, the zero defect is one that may not be completely attainable; however, evidence exists that it can be closely approximated. Defects are caused either by lack of knowledge or by lack of attention. Lack of knowledge can be corrected by proper training, lack of attention by effective leadership. Note also that the zero defects concept implies the ultimate elimination of failure costs. Those believing in zero defects will continue to search for new ways to improve quality costs. Thus, implicit in the standard is the capability to move down the total cost curve shown in Exhibit 2-3.

Exhibit 2.3

**Graphic of zero defect approach**




2.3.4 Quantifying the Quality Standard

Quality can be measured by its cost; as the cost of quality decrease, higher quality result, at least up to a point. Even if the standard of zero defects is achieved, a company must still have prevention and appraisal costs. A company with well run quality management program can get by with quality cost that are no more than 2.5 percent of sales, which is for prevention and appraisal.

The 2.5 percent standard is for total cost of quality. Cost of individual quality factors, such as quality training or material inspection, will be less. Each organization must determine the appropriate standard for each individual factor. Budgets can be used to set spending for each standard so that the total budgeted cost meets the 2.5 percent goal (Hansen and Mowen 1995:912).

2.3.5 Behavior of Quality Cost

To make the 2.5 percent standard work, the cost behavior of individual quality factor must be identified. For performance reports to be useful, quality cost must be classified as variable or fixed with respect to sales.

If maintaining a zero-defects standard requires a 1.5 percent variable cost ratio, meeting the overall goal of cost at 2.5 percent of sales limits fixed quality cost to 1 percent of sales. This budget for fixed quality cost would be set at the beginning of the year.

Fixed costs are evaluated by comparing actual costs with the budgeted costs. The Rupiahs actually spent on these cost are what is compared. Since budgeted sales may not equal actual sales, the actual percentage could be greater or less than the budgeted percentage even if the actual fixed cost were exactly equal to the budgeted fixed cost.

Variable quality costs can be compared using either percentages of sales or actual Rupiahs or both. The best approach is comparing absolute Rupiahs and supplementing that measure with percentages. For variable quality cost, improvements in quality are reflected by reductions in the variable cost ratios.

2.3.6 Physical Standards

For line managers and operating personnel, physical measures of quality such as number of defect per unit, the percentage of external failures, billing errors, contract errors, and other physical measures may be more meaningful. For physical measures, the quality standard is zero defect or errors. The objective is to get everyone to do it right in the first time (Hansen and Mowen 1995:914).

2.3.7 Use of Interim Standards

For most firms, the standard of zero defects is a longrange goal. Because improving quality to zero-defects level can take years, yearly quality improvement standards should be developed so that managers can use performance reports to assess the progress made on the interim basis. These interim quality standards express quality goals for the year. Progress should be reported to managers and employees in order to gain the confidence needed to achieve the ultimate standard standard of zero defects. Even though reaching the zero defects level is a long range project, management should expect significant progress on a yearly basis. Performance reports, at this stage, assume a strict control role (Hansen and Mowen 1995:914).

2.3.8 Types of Quality Performance Report

Quality performance reports measure the progress realized by an organization's quality improvement program. Four types of progress can be measured and reported (Hansen and Mowen 1995:914):

1. Progress with respect to a current-period standard or goal (an interim standard report).
2. Progress with respect to last year's quality performance (a one-period trend report).
3. The progress trend since the inception of the quality improvement program (a multiple-period trend report).
4. Progress with respect to the long-range standard or goal (a long-range report)

2.3.8.1 Interim Standard Report

The organization must establish an interim quality standard each year and make plans to achieve this targeted level. Since quality costs are measure of quality, the targeted level can be expressed in Rupiahs budgeted for each category of quality costs and for each cost item within the category. At the end of the period, the interim quality performance report compares the actual quality cost for the period against the bugeted cost. This report measures the progress achieved within the period relative to the planned level of progress for that period.

Exhibit 2-4 illustrate such report. For variable costs, th budgeted figures are based on actual sales using variable cost ratios, which were obtained by dividing budgeted variable costs by budgeted sales. The original budgeted amounts are used for fixed costs. The interim report reveals the within-period quality improvement relative to specific objectives as reflected by the budgeted figures (Hansen and Mowen 1995:915).

2.3.8.2 One-Year Trend

Additional insight can be realized by comparing the current year's performance with what the cost of quality would have been using the prior year's quality costs by using a one-year quality performance report. To make this comparison, the prior year's actual variable cost ratio is used to compute the variable quality cost expected under the prior year's cost structure by multiplying the ratio by this year's actual sales. The prior year's actual fixed quality costs are compared directly with this year's fixed quality costs. This report allows managers to assess the short-run trend of its quality improvement program.

Exhibit 2.4

**Jensen Products**
**Interim Standard Performance Report: Quality Costs**
**For the Year Ended March 31, 1995**

| | *Actual Costs* | *Budgeted Costs* | *Variance* |
|---|---|---|---|
| Prevention costs: | | | |
| Fixed : | | | |
| Quality training: | $ 35,000 | $ 30,000 | $ 5,000 U |
| Reability engineering | 80,000 | 80,000 | 0 |
| Total prevention costs | $ 115,000 | $ 110,000 | $ 5,000 U |
| Appraisal costs | | | |
| Variable : | | | |
| Materials inspection | $ 20,000 | $ 28,000 | $ 8,000 F |
| Product acceptance | 10,000 | 15,000 | 5,000 F |
| Process acceptance | 38,000 | 35,000 | 3,000 U |
| Total appraisal costs | $ 68,000 | $ 78,000 | $ 10,000 F |
| Internal failure costs: | | | |
| Variable : | | | |
| Scrap | $ 50,000 | $ 44,000 | $ 6,000 U |
| Rework | 35,000 | 36,500 | 1,500 F |
| Total Internal failure costs | $ 85,000 | $ 80,500 | $ 4,500 U |
| External failure costs: | | | |
| Fixed: | | | |
| Customers complaints | $ 25,000 | $ 25,000 | $ 0 |
| Variable : | | | |
| Warranty | 25,000 | 20,000 | 5,000 U |
| Repair | 15,000 | 17,500 | 2,500 F |
| Total external failure costs | $ 65,000 | $ 62,500 | $ 2,500 U |
| Total quality costs | $ 333,000 | $ 331,000 | $ 2,000 U |
| Percentage of actual sales | 11.89% | 11.82% | 0.07% U |

Exhibit 2.5

**Jensen Products**
**Performance Report: Quality Costs, One-Year Trend**
**For the Year Ended March 31, 1996**

| | *Actual Costs 1996* | *Actual Costs 1995* | *Variance* | |
|---|---|---|---|---|
| Prevention costs: | | | | |
| Fixed : | | | | |
| Quality training: | $ 35,000 | $ 36,000 | $ 1,000 | F |
| Reability engineering | 80,000 | 120,000 | 40,000 | F |
| Total prevention costs | $ 115,000 | $ 156,000 | $ 41,000 | F |
| Appraisal costs | | | | |
| Variable : | | | | |
| Materials inspection | $ 20,000 | $ 33,600 | $ 13,600 | F |
| Product acceptance | 10,000 | 16,800 | 6,800 | F |
| Process acceptance | 38,000 | 39,200 | 1,200 | F |
| Total appraisal costs | $ 68,000 | $ 89,600 | $ 21,600 | F |
| Internal failure costs: | | | | |
| Variable : | | | | |
| Scrap | $ 50,000 | $ 48,000 | $ 2,000 | U |
| Rework | 35,000 | 40,000 | 5,000 | F |
| Total Internal failure costs | $ 85,000 | $ 88,000 | $ 3,000 | F |
| External failure costs: | | | | |
| Fixed: | | | | |
| Customers complaints | $ 25,000 | $ 33,000 | $ 8,000 | F |
| Variable : | | | | |
| Warranty | 25,000 | 23,000 | 2,000 | U |
| Repair | 15,000 | 16,400 | 1,400 | F |
| Total external failure costs | $ 65,000 | $ 72,400 | $ 7,400 | F |
| Total quality costs | $ 333,000 | $ 406,000 | $ 73,000 | F |

| | | | |
|---|---|---|---|
| Percentage of actual sales ( current year ) | 11.89% | 14.50% | 2.61% F |

Exhibit 2-5 is the example of One-Year Trend report (Hansen and Mowen 1995:915).

2.3.8.3 Multiple-Period Trend

The report in Exhibit 2-5 provides management with information concerning the change in quality costs relative to the most recent period. Also a useful picture of how the quality improvement program has been doing since its inception. Multiple-period quality trend report as in form of graph will give additional advantages by answering questions, such as:

1. Whether the multiple-period trend-the overall change in quality cost-is in the right direction?
2. Are significant quality gains being made each period?

Multiple-period quality trend reports answer these questions by providing graph or chart that tracks the change in quality from the beginning of the program to the present. By plotting quality costs as a percentage of sales against time, the overall trend in the quality program can be assessed. The first year plotted is the year prior to the implementation of the quality improvement program. Examples of Multiple-period quality trend report is shown in Exhibit 2-6 and 2-7 (Hansen and Mowen 1995:915).

2.3.8.4 Long-Range Standard

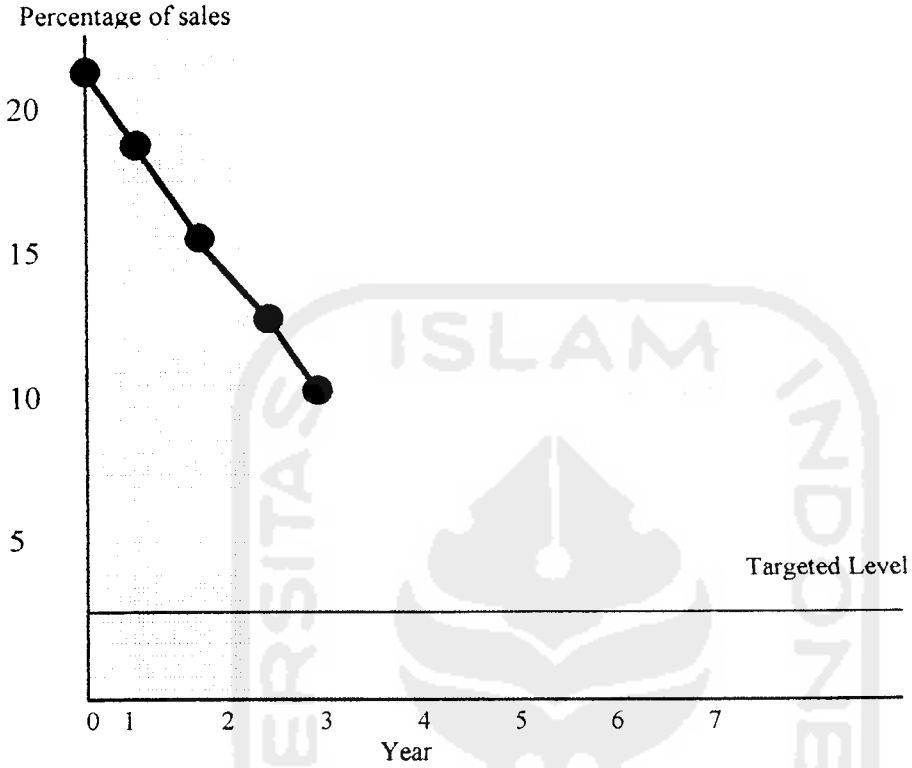
At the end of each period, a report that compares the period's actual quality costs with the costs that the firm eventually hopes to achieve should be

Exhibit 2.6

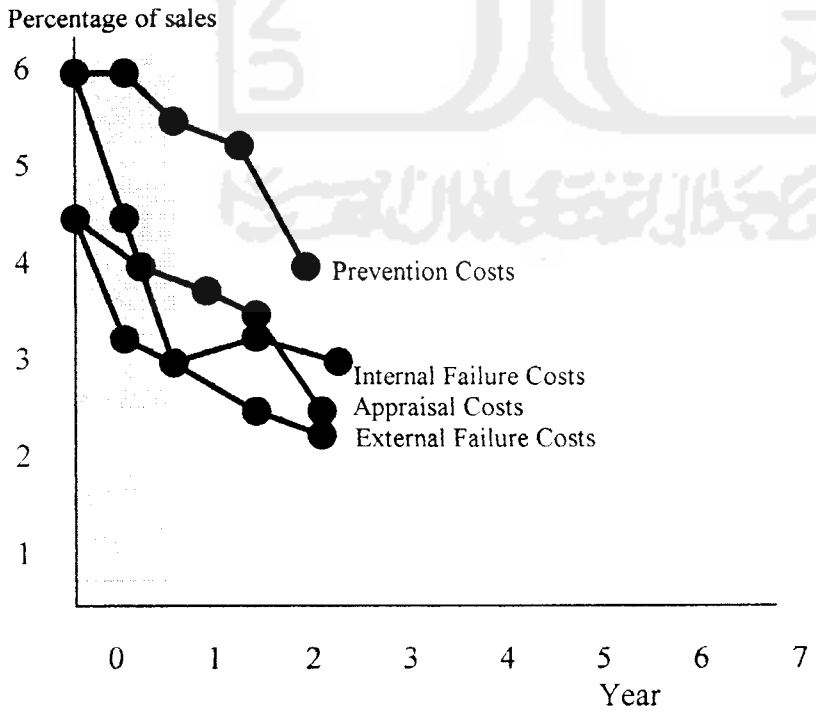
| | | Actual Costs | | Target Costs | | Variance | |
|---|---|---|---|---|---|---|---|
| Prevention costs: | | | | | | | |
| Fixed: | | | | | | | |
| Quality training | $ | 35,000 | $ | 15,000 | $ | 20,000 | U |
| Reability engineering | | 80,000 | | 40,000 | | 40,000 | U |
| Total prevention costs | $ | 115,000 | $ | 55,000 | $ | 60,000 | U |
| Appraisal costs | | | | | | | |
| Variable: | | | | | | | |
| Materials inspection | $ | 20,000 | $ | 5,000 | $ | 15,000 | U |
| Product acceptance | | 10,000 | | - | | 10,000 | U |
| Process acceptance | | 38,000 | | 10,000 | | 28,000 | U |
| Total appraisal costs | $ | 68,000 | $ | 15,000 | $ | 53,000 | U |
| Internal failure costs: | | | | | | | |
| Variable: | | | | | | | |
| Scrap | $ | 50,000 | $ | - | $ | 50,000 | U |
| Rework | | 35,000 | | - | | 35,000 | U |
| Total internal failure costs | $ | 85,000 | $ | - | $ | 85,000 | U |
| External failure costs: | | | | | | | |
| Fixed: | | | | | | | |
| Customers complaints | $ | 25,000 | $ | - | $ | 25,000 | U |
| Variable: | | | | - | | | |
| Warranty | | 25,000 | | - | | 25,000 | U |
| Repair | | 15,000 | | - | | 15,000 | U |
| Total external failure costs | $ | 65,000 | $ | - | $ | 65,000 | U |
| Total quality costs | $ | 333,000 | $ | 70,000 | $ | 236,000 | U |
| Percentage of actual sales | | 11.89% | | 2.50% | | 9.39% | U |

Exhibit 2.7

**Graphic of long range performance**




**Graphic of quality cost element in long range performance**



prepared. This report force management to keep the ultimate quality goal in mind, reveals the room left for improvement, and facilities planning for the coming period. Under a zero-defects philosophy, the cost of failure should be virtually nonexistent (they are nonvalue-added costs). Reducing the costs of failure increases a firm's competitive ability.

Achieving higher quality will not totally eliminate prevention and appraisal costs. In fact, increased emphasis on zero defects may actually increase the cost of prevention, depending on the type and level of prevention activities initially present. There is a place for expectation that appraisal costs to decrease. Product acceptance, for example, may be phased out entirely as product quality increases; however, increased emphasis on process acceptance is likely. The firm must have assurance that the process is operating in zero-defects mode. Exhibit 2-7 illustrates a long-range quality performance report. It compares the current period's actual costs with the costs that would be allowed if the zero-defect standard were being met (assuming a sales level equal to that of the current period). The target costs are, if chosen properly, value-added costs. The variances are nonvalue-added costs. Thus, the long-range performance report is simply a variation of the value- and nonvalue-added cost report.

The report emphasizes the fact that the company is still spending too much money on quality-too much for not doing things right the first time. As quality improves, savings can be realized by having fewer workers to correct the mistakes

made initially. Rework costs, for example, will disappear when there is no more rework, warranty costs will stop when there are no failures in the field, and so on.

By spending less money on defects, a company can use the money to expand and to employ additional people to support this expansion. Increased quality may naturally cause expansion by increasing the competitive position of a firm. By having fewer problems with existing products, a firm can focus more attention on growth (Hansen and Mowen 1995:918).

2.3.9 Incentives for Quality Improvement

Most organizations provide both monetary and nonmonetary recognition for significant contributions to quality improvement. Of the two types of incentives, most quality experts believe that the nonmonetary are more useful.

As with budgets, participation helps employees internalize quality improvement goals as their own. One approach used by many companies in their efforts to involve employees is the use of error cause identification forms. Error cause identification is a program in which employees describe problems that interfere with their ability to do the job right the first time. To ensure the success of the program, each employee submitting an entry should receive a note appreciation from management. Additional recognition should be given to those who submit particularly beneficial information.

Other nonfinancial awards can also be given to recognize employees for their efforts. The important thing is not the award itself but the public recognition of outstanding achievement. By publicly recognizing significant quality contributions, management underscores its commitment to quality improvement.

Also the individuals and groups so recognized feel that recognition, which include pride, job satisfaction, and a further commitment to quality (Hansed and Mowen 1995:919).

# CHAPTER III

# COMPANY PROFILE

## 3.1. General Data

### 3.1.1. Company History

The Jogjakarta Kusumatex Textile company was first set up in 1963 by Mr. Ashari using business permit No. 394/012/d/3211/II/1963. The company was first called ***Cindelaras*** weaving company and at that time was an individual (private) company. It is build on a 2000m$^2$ land at southern part of Jogjakarta, to be exact at Jl. Tirtodipuran no 8, Jogjakarta.

At the beginning the company operated with a weaving tool made from wood which was called a "not mechanical weaving tool" – *Alat Tenun Bukan Mesin (ATBM)* – and there were only a few of them, therefore the production was also low. Afterwards, step by step the company expanded. In 1975 finally they were able to renew the weaving tools to mechanical weaving tools – *Alat Tenun Mesin (ATM)*. After the company purchased the ATM, productions extended and were able to meet consumers demand. In just one year the company owned 40 ATM. With the support of these new machines, the company had an increase of production and this status was able to be sustained until 1982. Because of the economical condition going that got worse, the company experienced a financial crisis, and without proficient leadership in the company's management, the company came to a set back.

Further setbacks were experienced by the company. In 1983 the company had a total break down as a result it went bankrupt, and in that year the company was sold to Mr. Muwardi.

With the new ownership the company was given a new name replacing the old, which is the Jogjakarta Kusumatex textile company. In the hands of the new owner, the company experienced a relatively raised development with the operations of 72 ATM and one warming machine. The company was also expanded to Gamping and Jl Megelang, Jogjakarta.

The Jogjakarta Kusumatex textile company is company which processes yarn raw materials to clothing base materials such as blaco fabric or grey fabric. By the time the company came back in operation in 1983, it employed 70 workers, most of them are women.

3.1.2. Company Location

The Kusumatex textile company is located at Jl. Tirtodipuran no 8, kelurahan Mangkuyudan, kecamatan Mantrijeron, kodya Jogjakarta, DIY. The location of the company is considered to be good and profitable.

The location is chosen based on the following considerations:

1. Marketing

   Kusumatex textile company is located strategically because it facilitates the consumers to easily contact the company, therefore the sale of the company's product can go smoothly and easily and the cost can be pressed down as low as possible.

2. Workers

Kusumatex textile company is located in the suburbs of Jogjakarta, where the district is densely populated, thus it is not difficult for the company to look for productive workers.

3. Transportation

Kusumatex textile company is located next to a main road therefore it eases transportation where it links the factory to the market, material, and workers, from in or outside of the city.

Presently the Kusumatex textile company is setting up a subsidiary in Kulon Progo. This expansion to that certain area is very suitable considering the above criteria.

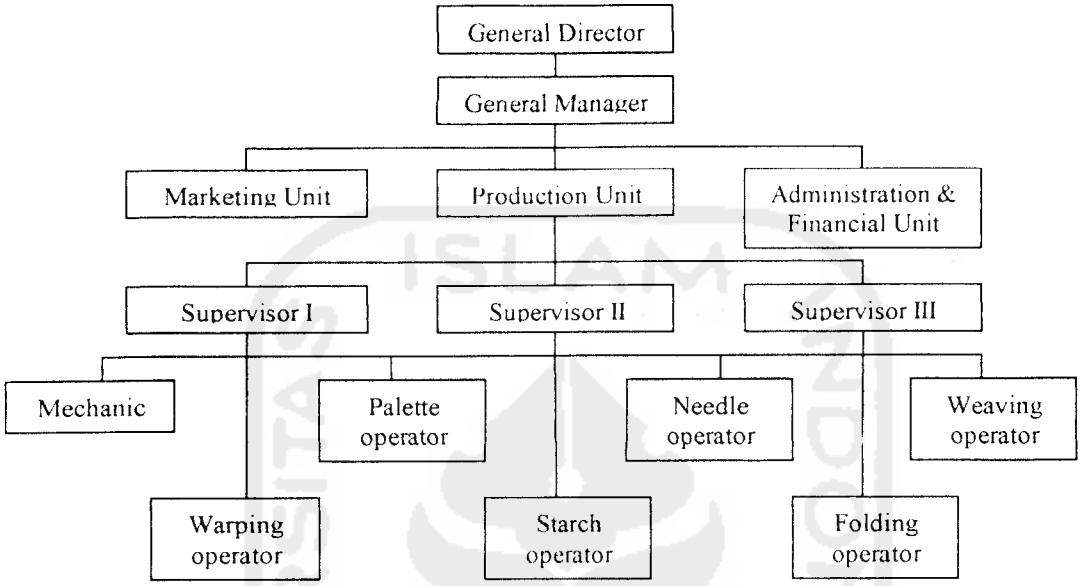
3.1.3. Company Organizational Structure

The organizational structure used by the Jogjakarta Kusumatex textile company is a linear organizational structure. In this type of structure, authority and command is in the hands of one sole leader, afterwards the authority and command from the highest leader is delegated to the sections below him, continued down to a chain of subordinates.

These sections are units that are independent headed by a supervisor who direct all the control function within it. This linear structure is often used by small companies or medium developing ones.

The Jogjakarta Kusumatex textile company can be seen in the following graph.

**Graphic 3.1**
**Organizational Structure of the**
**Jogjakarta Kusumatex Textile Company**




For further explanation, the organizational structure can be divided its work description:

1. General Director

   The owner of the company is the highest hierarchy on the running of the company. The activities of the owner are organizing and decision making in certain affairs so the company can run smoothly

2. General Manager

   Leading the company and completing the company's affairs so th company can run smoothly

3. Production Unit

In charge on executing and controlling all the process of production, which includes the quantity, types and quality of production

4. Administration and Financial Unit

   This unit is in charge of administration affairs either within or outside the company and controlling the financial also documenting the company's activities

5. Marketing Unit

   This unit's duty is purchasing raw material, trading, promotion, and sales.

6. Supervisor

   Their tasks are helping production in supervising each operation within the production process

7. Mechanic

   Responsible towards the operations of all the machines also maintenance and fixing mechanical problems

8. Warping Operator

   The task of controlling the warping machine on rolling the threads to the spool

9. Palette Unit

   The task of rolling the threads from the cone sheaf to the palettes

10. Starching Unit

    The continuing from the previous activity at the palette machine, which is starching the threads

11. Needle Unit

The tack of separating thread in the boom warping using a certain needle

12. Weaving Unit

The task of controlling the weaving machine and changing the small palettes, which is placed vertically in the machine, when the small palettes are out of thread

13. Folding Unit

In this unit the folding process of the fabrics, which is the process continued by moving it to the warehouse

3.1.4. Production Division

The production process is a way, method or the technique on how to create a whole new use/value or partially adding to it.

The Jogjakarta Kusumatex textile company adapts the "continuing process" method, therefore the implementation steps of production in the past, present and the future will always be the same.

In the production process the raw material used are threads from the Jogjakarta and West Java region as well as additional material such as:

a. Starch
b. PFA
c. Kendal
d. Coridril

Thus the steps of production process are divided into the following main stages:

1. Warping stage

   In this stage the cleaning and download the thread rolls which is still pressed or in packages. Then the threads are put into warping packages. In the machines these thread rolls are the then rolled into one huge roll, in a part called boom warping. Threads are then prepared as a length thread (lusi thread)

2. Starch stage

   In this stage the boom from the warping machine is then entered in this part where starch are mixed with kendal, PFA, and coridril. Then the threads are put back together in a part called boom starch.

3. Needling stage

   In this stage needles are connected with the threads then they are combed.

4. Palette stage

   In this stage the threads are taken apart and cleaned. The threads that are put into palettes are tied onto small tubes, where it will be used as the vertical threads.

5. Weaving stage

   In this stage the threads from both parts, the needling part (horizontal threads) and the palette part (vertical threads) are combined. Finally the threads from both parts are weaved into fabric.

6. Brushing stage

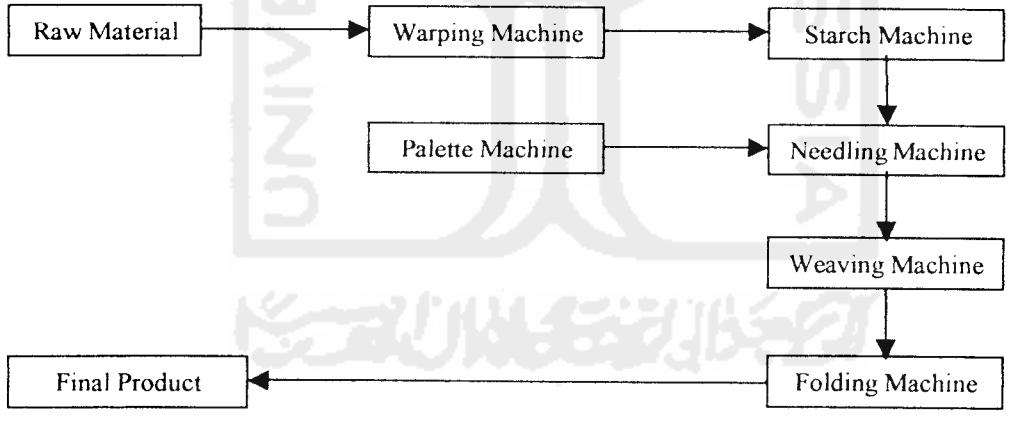
   In this stage the threads are brushed to clean the unwanted elements also to check the grey fabric and cut some parts of the fabric if considered necessary.

7. Folding stage

   Here is the final folding process where all the fabrics are cleanly brushed then put in containers in final product warehouse.

The schematic production process can be seen in the following graphic 3.2. Meanwhile the machines used in the production process of the Jogjakarta Kusumatex textile company are imported from Taiwan, these machines can be seen in Table 3.1.

**Graphic 3.2**
**Production Process of Grey Fabric**
**Jogjakarta Kusumatex Textile Company**




Source: Jogjakarta Kusumatex Textile Company

Table 3.1 Name and Quantity of machines

| Name | Quantity |
|---|---|
| Warping machine | 1 unit |
| Palette machine | 12 unit |
| Weaving machine | 72 unit |
| Needling machine | 3 unit |
| Folding machine | 2 unit |
| Starching machine | 3 unit |

3.1.5. Company Funding

The funds used in the Jogjakarta Kusumatex textile company are from private funding as well as bank loans, here the company uses a loan scheme such as a long term/soft loan from Bank Central Asia (BCA) and Regional Development Bank (Bank Pembangunan Daerah-BPD).

3.1.6. Work Force

1. Work Force Quantity

   The numbers of employees working for Jogjakarta Kusumatex Textile Company are 135 workers, 27 of them are men employees and 108 of them are women.

2. Work Force Distribution

   The distributions of employment in the company are:

a. Production employees

Here the employees are divided in 3 (three) shifts: shift 1, 2 and 3. this is because the company operates in a 24 hour time schedule, each shifts has an 8-hour-work-time.

b. Office employees

Office employees do not have any shifts, therefore it is a fix work time where it starts in the morning.

3. Work Time

The working time of the employees is 8 hour/day which includes a 1 hour break, and operates in a 6 days/week. The time schedule can be seen in the following table:

| Type of Employment | Working Time |
|---|---|
| Shift Employees | |
| - Shift 1 | 07.00 am – 15.00 pm |
| - Shift 2 | 15.00 pm – 23.00 pm |
| - Shift 3 | 23.00 pm – 07.00 am |
| Office Employees | 08.00 am – 16.00 pm |

4. Wage System

The wage system adapted by Kusumatex textile company is divided in three types of wages depending on the type of work.

| Type of Wages | Type/Units |
|---|---|
| Daily Wages | - Mechanics and assistant mechanics<br>- Cleaning service<br>- Folding unit and brushing unit<br>- Warping unit |
| Contract Wages | - Needling unit<br>- Machine operator |
| Fixed / Monthly Wages | - Office employees |

5. Other Company Benefits

The benefits given by the company for the employees includes:

a. Meal

b. Uniform

c. Holyday subsidies

d. Health

e. Insurance

f. Employment leave

g. Sports facilities

h. Mortal/death subsidies

i. Praying/religious facilities

## 3.2. Specific Data

In their efforts on maintaining and increasing the quality of their product, the company adapts certain policies related to those efforts, which are the following activities:

a. Training and Education for the Employees.

This effort is aimed to train and educate the employees so they can be directly involved in the effort of developing and controlling the quality of their products. For this effort each department is encouraged to form a team called "quality control group".

In each quality control group ideally only involves 6-8 person, where one acts as the team leader and the secretary. The duties of a team leader are mainly to make a meeting schedule and arrange the course of the meeting.

In the first meeting each team must put forward a certain theme in their working environment and give it a certain title. Afterwards in each meeting every member must also put forward a certain issue in their working environment, every issue is written down by the team leader, subsequently every issue is listed using a certain tool called "pareto diagram" (a format where the data of the issues from each working environment of each team shaping like the scales of a fish). The use of the pareto diagram is to see how far those issues are elated and their influences. After all the issues are combined with the related data, the next step is to discuss it in internal level. Finally all the issues, data, and

solutions are summarized with a certain theme or program of the team, it is then submitted to a higher level for presentation. If the issue(s) and the solution(s) are rational, the management of the company will then put through that theme or program by upgrading the working environment of that team.

The training period certainly will be held when it would not interfere with production process, therefore it will be held not in the working hours.

The training and education activities are held only 2-3 times a year, where the schedule will be adjusted with production schedule. From this activity other cost will emerged such as: transportation cost of each member, facility cost (markers, block note, pen etc.), as well as accommodation cost during the training and education period take place.

b. Maintenance of the Production Machines

The company performs maintenance of the production machines in order to keep the machines can be operated as long as production goes on, avoiding premature brake down, so that the quality of the product from the machines would not decrease. Maintenance of the production machines is done by the operator of that certain machine along with the mechanic. Therefore the cost that occurred besides the cost for machine maintenance (oil exchange, production waste cleaning, control or exchanging spare parts like broken spinning wheel, etc.) also includes the wages for the mechanics.

c. Quality Planning

The cost of quality planning of the company emerged from the activity or study done to enhance the quality of the product such as raw material study, assembling testing procedure, etc.

d. Process Checking

The activities done in the process checking are the checking and controlling from processing raw material to final production. The costs emerged from this activity are transportation cost for the controller, the cost for checking the product while it is still in the process, just to make sure if the product is not a defect product.

e. Product Control and Testing

Even though the raw materials used by the company are considered to be good and control processes are also strict, it does not assure that the whole products produced by the company are all high quality. The chances that mistakes or failure in the production process of the company could always occur. Therefore if at the final production of the company a quality control is not done, there is a possibility that the product would be below the specific quality standard, and could end at the hands of the consumer, this would effect the company's reputation.

To avoid this to happen, to company must conduct product control before productions are sent to the consumers. Product quality control is

conducted by checking the entire final product that will be sent. Here the control processes are particularly done at the package, sh pe, and color of the product, along with examining the packaging and distribution. For this task the company put together a special group of employees that are trained and especially responsible for conducting final product control.

Even though quality policies had been implemented, the company must still bear the excess raw materials cost, which is the cost that occurred from the processed threads that are not used. It means that the quantity is over purchased and excesses the production needs. This occurred because the company in determining the amount of annual production is not balanced by the amount of product sold each month. Consequently the supply for each month would fluctuate. This would cause the company to put out extra cost for storing and maintaining excess material, working cost increases and other cost might follow as well.

# CHAPTER IV

# DATA ANALYSIS

## 4.1 Identifying Quality Cost Element

Based on the research conducted on PT. Kusumatex related to the quality program implemented by the company, the researcher found that there were no identification of element of quality cost in their quality cost report. In order to identify quality cost element, the researcher must analyze the data that were gathered from different divisions which operation is related in maintaining quality.

The quality cost elements implemented by the company that can be identified based on the report issued by the company are as follow:

1. Prevention
    a. Quality training and education
    b. Maintenance of production machinery
    c. Quality planning
2. Appraisal
    a. Product evaluation and inspection
    b. Process evaluation
3. Internal failure
    a. Scrap

4.2 Quality Cost Report

Quality cost report is a quality cost control instrument used in order to improve quality control. It is essential for the management in order to make the right decision regarding the activities implemented in the company. Quality cost report provides feedback to evaluate effort and result that the management needs to improve of their performance. Quality cost report enables the management to select which activities that should be improved, maintained, corrected or even removed.

Based on the quality cost report made by the management and after observing and interviewing the company, the researcher concluded that the company's quality program is taken from the traditional point of view which is considered as acceptable quality level. Therefore, in order to analyze the quality cost, the researcher used non-linear regression as the statistical tool. The data that were analyzed came from the thirty-six months of quality reports from the year 2000 until the year 2002 as shown in exhibit 4.1.

From that thirty-six month of quality cost reports shown in exhibit 4.1, the researcher transformed the data from division operation into quality cost element as shown in exhibit 4.2.

The table shown as a presentation of all elements of quality cost which the company had spent in three years. In order to simplify the equation, the element of the quality cost are presented in form of percentage as shown in exhibit 4.3.

Exhibit 4.1

**PT. Kusumatex**

**Monthly quality cost report for the year 2000-2002**

| 2000 | MONTH | TE | MPM | QP | PE | PEI | S | TQC |
|---|---|---|---|---|---|---|---|---|
| | JAN | 0 | 1545200 | 0 | 542700 | 348400 | 734550 | 3170850 |
| | FEB | 0 | 1908650 | 128500 | 560650 | 535750 | 950000 | 4083550 |
| | MAR | 0 | 875300 | 104750 | 435200 | 751600 | 725400 | 2892250 |
| | APR | 158800 | 1171450 | 97400 | 658700 | 432800 | 1375200 | 3894350 |
| | MAY | 0 | 520600 | 138200 | 495450 | 1315500 | 1601000 | 4070750 |
| | JUN | 0 | 1450700 | 0 | 472900 | 475550 | 2150000 | 4549150 |
| | JUL | 198400 | 1735500 | 155800 | 591200 | 325000 | 1045800 | 4051700 |
| | AUG | 0 | 680200 | 85600 | 465800 | 755800 | 765650 | 2753050 |
| | SEPT | 0 | 2231600 | 162300 | 393400 | 420700 | 1825200 | 5033200 |
| | OCT | 240500 | 838500 | 0 | 484300 | 412600 | 1650000 | 3625900 |
| | NOV | 0 | 1650400 | 152700 | 651500 | 430500 | 951700 | 3836800 |
| | DEC | 0 | 890200 | 85900 | 371800 | 511200 | 545000 | 2404100 |
| | TOTAL | 597700 | 15498300 | 1111150 | 6123600 | 6715400 | 14319500 | 44365650 |

| 2001 | MONTH | TE | MPM | QP | PEI | PE | S | TQC |
|---|---|---|---|---|---|---|---|---|
| | JAN | 0 | 1721800 | 152700 | 431450 | 2117600 | 1231400 | 5654950 |
| | FEB | 225000 | 1315400 | 0 | 395500 | 1832500 | 1428200 | 5196600 |
| | MAR | 0 | 1431600 | 182800 | 371850 | 1738400 | 1711800 | 5436450 |
| | APR | 0 | 2541500 | 108600 | 657300 | 2230700 | 1235700 | 6773800 |
| | MAY | 255750 | 1622700 | 212700 | 526800 | 1611300 | 2042600 | 6271850 |
| | JUN | 0 | 1324300 | 230400 | 755600 | 1438200 | 1861500 | 5610000 |
| | JUL | 122700 | 2442600 | 0 | 632700 | 2325400 | 2106700 | 7630100 |
| | AUG | 0 | 2041200 | 171600 | 521500 | 2120200 | 2420300 | 7274800 |
| | SEPT | 0 | 1263500 | 105200 | 810400 | 1837800 | 2518200 | 6535100 |
| | OCT | 0 | 1430300 | 0 | 722800 | 1626750 | 2131700 | 5911550 |
| | NOV | 211400 | 2051800 | 241800 | 527400 | 2041250 | 2042600 | 7116250 |
| | DEC | 0 | 1548200 | 115300 | 427300 | 1511600 | 2531700 | 6134100 |
| | TOTAL | 814850 | 20734900 | 1521100 | 6780600 | 22431700 | 23262400 | 75545550 |

| 2002 | MONTH | TE | MPM | QP | PE | PEI | S | TQC |
|---|---|---|---|---|---|---|---|---|
| | JAN | 0 | 2051400 | 201700 | 2411600 | 451600 | 1365200 | 6481500 |
| | FEB | 0 | 1502200 | 155400 | 2030400 | 342700 | 1520700 | 5551400 |
| | MAR | 375000 | 1731500 | 0 | 1750200 | 520300 | 2110300 | 6487300 |
| | APR | 0 | 2110700 | 182600 | 1576600 | 741600 | 2341200 | 6952700 |
| | MAY | 0 | 1345300 | 225500 | 2042500 | 651800 | 1925600 | 6190700 |
| | JUN | 420000 | 1650200 | 211700 | 1864300 | 524400 | 2172400 | 6843000 |
| | JUL | 0 | 1473500 | 0 | 1783200 | 660500 | 2530500 | 6447700 |
| | AUG | 250000 | 2072800 | 220800 | 2255700 | 472400 | 2315200 | 7586900 |
| | SEPT | 0 | 2008500 | 174200 | 2036200 | 861200 | 1860700 | 6940800 |
| | OCT | 0 | 1750400 | 182600 | 1837800 | 578600 | 2501400 | 6850800 |
| | NOV | 280000 | 1533200 | 0 | 1581200 | 430400 | 2875600 | 6700400 |
| | DEC | 0 | 1280600 | 0 | 1365600 | 365300 | 2604200 | 5615700 |
| | TOTAL | 1325000 | 20510300 | 1554500 | 22535300 | 6600800 | 26123000 | 78648900 |

Notes:

TE : Training and education

MPM : Maintenance of production machine

QP : Quality planning

PE : Process evaluation

PEI : Product evaluation and inspection

S : Scrap

TQC : Total quality cost

Exhibit 4.2

**PT. Kusumatex**

**Quality cost element in monthly data for the year 2000-2002**

| 2000 | MONTH | PREVENTION | APPRAISAL | FAILURE | TQC |
|---|---|---|---|---|---|
| | JAN | 1545200 | 891100 | 734550 | 3170850 |
| | FEB | 2037150 | 1096400 | 950000 | 4083550 |
| | MAR | 980050 | 1186800 | 725400 | 2892250 |
| | APR | 1427650 | 1091500 | 1375200 | 3894350 |
| | MAY | 658800 | 1810950 | 1601000 | 4070750 |
| | JUNE | 1450700 | 948450 | 2150000 | 4549150 |
| | JULY | 2089700 | 916200 | 1045800 | 4051700 |
| | AUG | 765800 | 1221600 | 765650 | 2753050 |
| | SEPT | 2393900 | 814100 | 1825200 | 5033200 |
| | OCT | 1079000 | 896900 | 1650000 | 3625900 |
| | NOV | 1803100 | 1082000 | 951700 | 3836800 |
| | DEC | 976100 | 883000 | 545000 | 2404100 |
| | TOTAL | 17207150 | 12839000 | 14319500 | 44365650 |

| 2001 | MONTH | PREVENTION | APPRAISAL | FAILURE | TQC |
|---|---|---|---|---|---|
| | JAN | 1874500 | 2549050 | 1231400 | 5654950 |
| | FEB | 1540400 | 2228000 | 1428200 | 5196600 |
| | MAR | 1614400 | 2110250 | 1711800 | 5436450 |
| | APR | 2650100 | 2888000 | 1235700 | 6773800 |
| | MAY | 2091150 | 2138100 | 2042600 | 6271850 |
| | JUNE | 1554700 | 2193800 | 1861500 | 5610000 |
| | JULY | 2565300 | 2958100 | 2106700 | 7630100 |
| | AUG | 2212800 | 2641700 | 2420300 | 7274800 |
| | SEPT | 1368700 | 2648200 | 2518200 | 6535100 |
| | OCT | 1430300 | 2349550 | 2131700 | 5911550 |
| | NOV | 2505000 | 2568650 | 2042600 | 7116250 |
| | DEC | 1663500 | 1938900 | 2531700 | 6134100 |
| | TOTAL | 23070850 | 29212300 | 23262400 | 75545550 |

| 2002 | MONTH | PREVENTION | APPRAISAL | FAILURE | TQC |
|---|---|---|---|---|---|
| | JAN | 2253100 | 2863200 | 1365200 | 6481500 |
| | FEB | 1657600 | 2373100 | 1520700 | 5551400 |
| | MAR | 2106500 | 2270500 | 2110300 | 6487300 |
| | APR | 2293300 | 2318200 | 2341200 | 6952700 |
| | MAY | 1570800 | 2694300 | 1925600 | 6190700 |
| | JUNE | 2281900 | 2388700 | 2172400 | 6843000 |
| | JULY | 1473500 | 2443700 | 2530500 | 6447700 |
| | AUG | 2543600 | 2728100 | 2315200 | 7586900 |
| | SEPT | 2182700 | 2897400 | 1860700 | 6940800 |
| | OCT | 1933000 | 2416400 | 2501400 | 6850800 |
| | NOV | 1813200 | 2011600 | 2875600 | 6700400 |
| | DEC | 1280600 | 1730900 | 2604200 | 5615700 |
| | TOTAL | 23389800 | 29136100 | 26123000 | 78648900 |

Exhibit 4.3

**PT. Kusumatex**

**Percentages of quality cost element in monthly data for the year 2000-2002**

| TQC/COGM% | C/TQC% | F/TQC% | AP/COGM% |
|---|---|---|---|
| 0.95580718 | 76.8342873 | 23.1657127 | 99.7785805 |
| 2.10070557 | 76.7359283 | 23.2640717 | 99.5112904 |
| 1.27882858 | 74.9191806 | 25.0808194 | 99.6792593 |
| 1.69584043 | 64.6873034 | 35.3126966 | 99.401153 |
| 1.7942317 | 60.6706381 | 39.3293619 | 99.7832333 |
| 2.13673126 | 52.7384237 | 47.2615763 | 98.9901471 |
| 1.97617499 | 74.1886122 | 25.8113878 | 99.4899218 |
| 1.31073452 | 72.1890267 | 27.8109733 | 99.635472 |
| 2.05337134 | 63.7367877 | 36.2632123 | 99.2553816 |
| 1.69197647 | 54.4940566 | 45.5059434 | 99.2300501 |
| 1.60547354 | 75.1954754 | 24.8045246 | 99.6017699 |
| 3.80959957 | 77.3303939 | 22.6696061 | 99.1363788 |

| TQC/COGM% | C/TQC% | F/TQC% | AP/COGM% |
|---|---|---|---|
| 2.22962036 | 78.2243875 | 21.7756125 | 99.5144865 |
| 1.72755667 | 72.5166455 | 27.4833545 | 99.5252095 |
| 1.91874322 | 68.5125404 | 31.4874596 | 99.3958365 |
| 2.39986452 | 81.7576545 | 18.2423455 | 99.5622084 |
| 2.22689104 | 67.4322568 | 32.5677432 | 99.2747518 |
| 2.25963113 | 66.8181818 | 33.1818182 | 99.2502133 |
| 2.26034583 | 72.3896148 | 27.6103852 | 99.3759098 |
| 3.88303766 | 66.7303568 | 33.2696432 | 98.7081272 |
| 4.26921639 | 61.4665422 | 38.5334578 | 98.3549233 |
| 3.07737998 | 63.9400834 | 36.0599166 | 98.8902993 |
| 4.78809102 | 71.2966801 | 28.7033199 | 98.6256589 |
| 4.92208761 | 58.7274417 | 41.2725583 | 97.9685285 |

| TQC/COGM% | C/TQC% | F/TQC% | AP/COGM% |
|---|---|---|---|
| 1.89118769 | 78.9369745 | 21.0630255 | 99.6016587 |
| 1.55078904 | 72.60691 | 27.39309 | 99.575191 |
| 1.68670377 | 67.4702881 | 32.5297119 | 99.4513201 |
| 1.97304354 | 66.3267508 | 33.6732492 | 99.3356121 |
| 1.85324637 | 68.8952784 | 31.1047216 | 99.4235529 |
| 2.51803701 | 68.2536899 | 31.7463101 | 99.2006162 |
| 2.70022381 | 60.753447 | 39.246553 | 98.9402552 |
| 2.00817457 | 69.4842426 | 30.5157574 | 99.3871903 |
| 2.91626711 | 73.1918511 | 26.8081489 | 99.2182028 |
| 2.72700393 | 63.4874759 | 36.5125241 | 99.004302 |
| 2.45748069 | 57.0831592 | 42.9168408 | 98.9453269 |
| 5.93978475 | 53.6264402 | 46.3735598 | 97.2455104 |

4.3 Analyzing The Behavior of Quality Cost

The main purpose of this research was to seek whether the company's quality program has met its objectives. Therefore the researcher analyzed the behavior of the element of quality cost. Each element has an effect toward others. The change of one element will affect other element. Further, by analyzing the element of quality cost the researcher found:

1. The effect of one element towards other
2. The optimal level of quality cost

In order to find the optimal level of the company's quality cost, the researcher used acceptable quality level, which is in accordance with traditional point of view. According to the traditional point of view, there is a trade off between control cost (prevention and appraisal) and failure cost (in this case internal failure). As control cost increase should be followed by decrease in failure. As long as the decrease in failure cost is greater than the corresponding increase in control cost, a company should continue to expand its effort costs to prevent or detect nonconforming units. Optimal level occurs when a point is reached at which any additional increase in this effort costs more than the corresponding reduction in failure cost.

The tool used to analyze the reports was non-linear regression because the researcher found that it was quite representative related to the form of data and the expected result. In order to analyze the behavior of the quality cost, the researcher

used cost driver as the causal factor of the element of quality cost. First the researcher analyzed the optimum value of total quality cost towards manufacture cost as the cost driver. After the value of the optimum value of total quality cost had been obtained, the value of the optimal level of accepted product could be calculated.

The equation of the non-linear regression is as follows:

$$Y = a + bx + cx^2$$

Where:

Y = The percentage of total quality cost towards accepted product

x = The percentage of total quality cost towards cost of manufactured

a = Constant

b = Regression coefficient

c = Regression coefficient

Before the researcher analyzed the total quality level behavior towards accepted product, the researcher should first analyze the behavior of quality cost element towards total quality cost and the optimal level between control cost and failure cost. The form of the equation is $Y = a + bx + cx^2$, where Y is the percentage of the total quality cost towards cost of manufacture as dependent variable and x are the percentage of the element of quality cost towards total quality cost as the independent variable.

After processing each equation of the quality cost element, the researcher found optimal level between control and failure. Afterwards, the researcher substituted the optimal level in the equation of accepted product.

In applying non-linear regression in order to tabulate and analyze the data, the researcher used computer software program to assist in the calculation. The data analyzed were monthly data with the total number of 36 months from the year 2000 until the year 2002 in percentage form of cost of manufacture. The tabulation of total quality cost (appendices) shows equations as follows:

a. $Ya = 0.0021Xa^2 - 0.3336Xa + 15.298$

b. $Yb = 0.0021Xb^2 - 0.0877Xb + 3.0021$

Where:

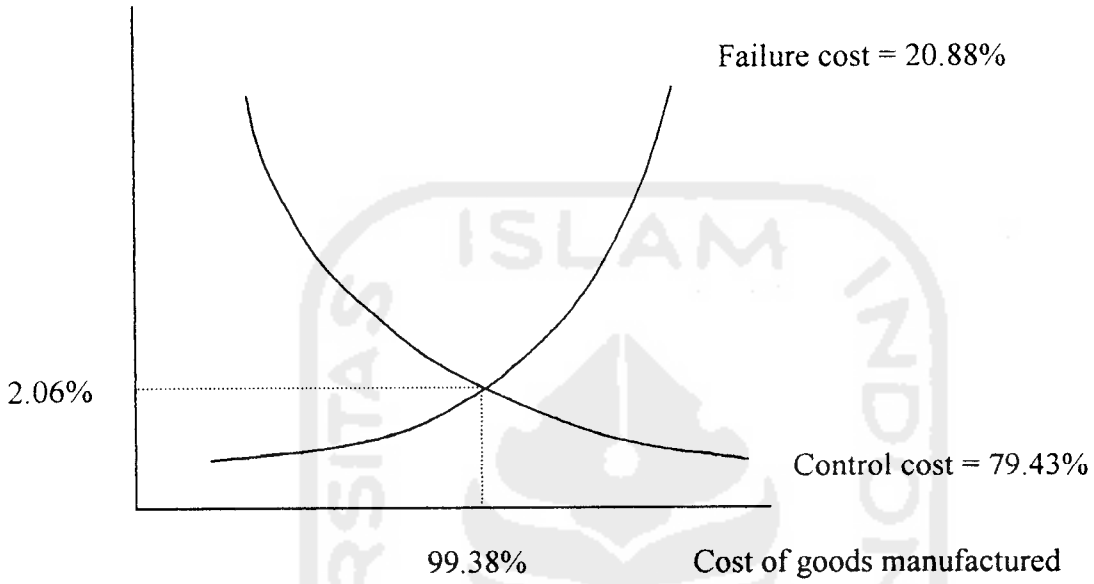
Y = percentage of total quality cost towards cost of manufactured

Xa = percentage of control cost (prevention and appraisal cost)

Xb = percentage of failure cost

Exhibit 4.4

Total Quality Cost




The shape of the diagram shown as the result of the tabulation had the tendency to curve as shown in exhibit 4.4. The optimal point of the diagram is the lowest point of the non-linear regression. Hence to found the optimal point of the equations above the formula of dy/dx = 0 is used. Therefore the researcher obtained:

$$Ya = 0.0021Xa^2 - 0.3336Xa + 15.298$$

$$Dy/dx = 0$$

$$0.0024Xa - 0.3336 = 0$$

$$0.0024Xa = 0.3336$$

$$Xa = 0.3336/0.0024$$

$$Xa = 79.4285$$

After the researcher had obtained the value of Xa, then the researcher substituted the value into the non-linear regression equation as follows:

$$Ya = 0.0021Xa^2 - 0.333Xa + 15.298$$
$$= 0.0021(79.4285)^2 - 0.333(79.4285) + 15.298$$
$$= 13.2487 - 26.4974 + 15.298$$
$$= 2.09$$

$$Yb = 0.0021Xb^2 - 0.0877Xb + 3.0021$$
$$Dy/dx = 0$$
$$0.0042Xb - 0.0877 = 0$$
$$0.0042Xb = 0.0877$$
$$Xb = 0.0877/0.0042$$
$$Xb = 20.881$$

Similar to the first equation, the researcher substituted the value of Xb into the equation, therefore the result is as follows:

$$Yb = 0.0021Xb^2 - 0.0877Xb + 3.0021$$

$$= 0.0021(20.881)^2 - 0.0877(20.881) + 3.0021$$

$$= 0.9156 - 0.8313 + 3.0021$$

$$= 2.09$$

As the result of the equation, the researcher found the optimal value of quality cost that was considered able to be obtained when the percentage of the total quality cost towards cost of manufacture reached 2.09% with the percentage composition of control cost was 79.43 % and failure cost was 20.88% from the total quality cost.

The best time obtain the percentage of optimal value of the accepted product was when the quality cost reaches the optimal value. Then the result of quality cost optimal value was substituted into the equation of non-linear regression as the independent variable.

$$Y = 99.798 - 0.0909x - 0.0514x^2$$

$$= 99.798 - 0.0909(2.09) - 0.0514(2.09)x^2$$

$$= 99.798 - 0.1818 - 0.2056$$

$$= 99.38$$

Based on the result of the non-linear regression equation of accepted product, the researcher obtained the percentage of the accepted product reached when the quality cost reaches the optimum value is 99.38%.

In order to analyze the quality cost behavior, the researcher compared the optimum value of total quality cost to yearly percentage of total quality cost based on cost of manufacture. The total quality cost percentage in the year 2000 reached 1.7% with 67.7% of control and 32.3% of failure. The total quality cost percentage in the year 2001 reached 2.7% with 69.2% of control and 30.85 of failure. In year 2002, the quality cost reached 2.23% of total quality cost with 66.8% of control and 33.2% of failure. According to the optimum level of total quality cost (2.09%), the nearest percentage of total quality cost to the optimum level was present in the year 2000 with 0.14% difference. However, the researcher considered that the overall operation of the company regarding the quality cost was quite exemplary.

# CHAPTER V

# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 CONCLUSIONS

From the result of the field research conducted in PT. Kusumatex in respect to the implementation of quality cost as a part of TQM, the researcher draws the following conclusions:

1. The researcher found that there are quality cost programs in the company but the programs are not implemented optimally. There is no identification of quality cost element that will help the management to understand better on what element that has added value and which has not.
2. According to the result of the research conducted by the researcher, the quality program that has been implemented by the company is able to maintain the production process and maintain the cost as the result of the production process.
3. The quality program implemented by the company, which is taken from the traditional point of view, is considered optimal.
4. The quality cost report is compiled from several departments with no identification of quality cost element. The identification that was done by the researcher found that there are three elements of quality costs. The elements

of the quality costs are prevention, appraisal and internal failure. There is no external failure element of the quality costs in the company's quality report.

## 5.2 RECOMMENDATIONS

Based on the conclusions above, the researcher proposed some recommendations as the basic consideration to quality costs as follows:

1. The company should identify the quality cost elements in order to have better evaluation of the quality cost activities. By having a better understanding towards the elements of quality costs the company will have better decisions in respect to the activities conducted by the company.
2. The company should consider the implementation of zero defect approach that will provide better benefit in the long-term range. This can be conducted by increasing the quality of human resources, raw material received process, production process until product is delivered to the customers.
3. The company should upgrade the form of the quality cost reports by having an interim standard report, a one-period trend report, a multiple year trend report and a long-range report.

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