

**PRODUCTION QUALITY CONTROL AT PRINTING COMPANY
FOR RADAR LAMPUNG IN PT LAMPUNG INTERMEDIA
BANDAR LAMPUNG**

(Undergraduate Thesis)

By

ZEFRI SEPTIABE



**FACULTY OF ECONOMICS AND BUSINESS
UNIVERSITY OF LAMPUNG
BANDAR LAMPUNG
2017**

ABSTRACT

PRODUCTION QUALITY CONTROL AT PRINTING COMPANY FOR RADAR LAMPUNG IN PT LAMPUNG INTERMEDIA BANDAR LAMPUNG

By

ZEFRI SEPTIABE

PT Lampung Intermedia is a printing company producing Radar Lampung Newspaper which always has effort to produce good products in every production and reduce the product damage with the standard of damage tolerance of 5 % of total production. In fact, there are still fluctuating levels of product damage and even exceed the standards of tolerance. The purpose of this research is to investigate the implementation of quality control that is used in the efforts to reduce the level of the product damage in the company. Quality control analysis are performed using check sheet, histogram, control chart p, and cause-effect diagrams (fishbone diagrams). Check sheet and histogram are used to present the data in order to make it easier to understand the data for further analysis. Control chart p is used to monitor damage products whether they are in control. Then looking for factors of the product damage by using a cause-effect diagrams (fishbone diagrams), for the proposed quality improvement. The result of control chart p analysis indicate that the process is in uncontrolled or still mismatch. This can be seen in the control graphic where the point fluctuates very high and various, and many are out of the control limits. From the analysis of cause-effect diagrams (fishbone diagrams), it may be known factors causing the product damage with the type of damage blur, unregistered or imprecised, asymmetrical fold, and clipped. They are derived from human or worker factors, machines, work methods, materials and work environment. From the factors that cause damage, the company can take preventative action and improvements for product quality and to reduce the level of the product damage.

Keywords: quality control and damaged products

ABSTRAK

PRODUCTION QUALITY CONTROL AT PRINTING COMPANY FOR RADAR LAMPUNG IN PT LAMPUNG INTERMEDIA BANDAR LAMPUNG

Oleh

ZEFRI SEPTIABE

PT Lampung Intermedia adalah perusahaan percetakan yang memproduksi Surat Kabar Harian (SKH) Radar Lampung selalu berupaya dalam produksi untuk menghasilkan produk yang baik dan menekan kerusakan produk dengan standar toleransi kerusakan sebesar 5 % dari jumlah produksi. Kenyataannya masih terdapat tingkat kerusakan produk yang fluktuatif dan bahkan melebihi standar toleransi. Tujuan dari penelitian ini adalah untuk mengetahui pelaksanaan pengendalian kualitas yang digunakan dalam upaya menekan tingkat kerusakan produk di perusahaan. Analisis pengendalian kualitas dilakukan menggunakan *check sheet*, histogram, peta kendali p, dan diagram sebab akibat (*fishbone diagrams*). *Check sheet* dan histogram digunakan untuk menyajikan data agar memudahkan dalam memahami data untuk keperluan analisis selanjutnya. Peta kendali p digunakan untuk memonitor produk yang rusak apakah masih berada dalam kendali. Kemudian mencari faktor-faktor yang menjadi penyebab terjadinya kerusakan produk yang menggunakan diagram sebab akibat (*fishbone diagrams*) untuk kemudian dapat disusun sebuah usulan perbaikan kualitas. Hasil analisis peta kendali p menunjukkan bahwa proses berada dalam keadaan tidak terkendali atau masih mengalami penyimpangan. Hal ini dapat dilihat pada grafik kendali dimana titik berfluktuasi sangat tinggi dan tidak beraturan, serta banyak yang keluar dari batas kendali. Dari analisis diagram sebab akibat (*fishbone diagrams*) dapat diketahui faktor penyebab kerusakan produk dengan jenis kerusakan yaitu warna kabur (*blur*), tidak register / tidak persisi, lipatan tidak simetris, dan terpotong adalah berasal dari faktor manusia atau pekerja, mesin, metode kerja, material dan lingkungan kerja. Dari faktor-faktor penyebab kerusakan, perusahaan dapat mengambil tindakan pencegahan serta perbaikan untuk menekan tingkat kerusakan produk dan meningkatkan kualitas produk.

Kata kunci: pengendalian kualitas dan produk rusak

**PRODUCTION QUALITY CONTROL AT PRINTING COMPANY
FOR RADAR LAMPUNG IN PT LAMPUNG INTERMEDIA
BANDAR LAMPUNG**

Researcher

ZEFRI SEPTIABE

Undergraduate Thesis

As One of The Requirements to Achieve
BACHELOR OF ECONOMICS

In

Management Departement
Faculty of Economics and Business University of Lampung



**FACULTY OF ECONOMICS AND BUSINESS
UNIVERSITY OF LAMPUNG
BANDAR LAMPUNG
2017**

**Thesis Title : PRODUCTION QUALITY CONTROL AT
PRINTING COMPANY FOR RADAR LAMPUNG
IN PT LAMPUNG INTERMEDIA BANDAR
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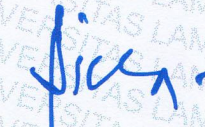
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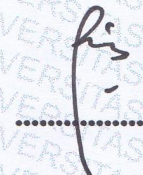
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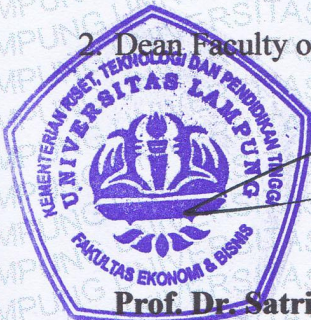

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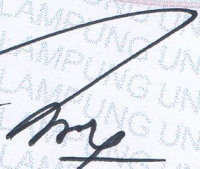

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With this stating that this undergraduate thesis is the result of my own work, and in this undergraduate thesis there are no whole or partial writings of others' by copying or imitating in form of sentences or symbols which show idea or arguments from other researchers, that I acknowledge it as my own writing, and there are no whole or partial writings which I copy and take from others' without the consent of the original researchers.

Thereby this statement is truly written, and may be used properly.

Bandar Lampung, April 27th 2017
Researcher



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BIOGRAPHY

The researcher was born in Kenali, on September 29th 1992, as the fifth child of five siblings, from Mr. Bachtiar and Mrs. Asnah Tanjung, and has two brothers and two sisters.

The researcher had started formal education from Kindergarten at TK Dharma Wanita Kenali which has graduated in 1999. The Elementary School was at SD Negeri 1 Kenali which has graduated in 2005. Researcher continued his education in Junior High School at SMP Negeri 1 Belalau and has graduated in 2008. Researcher continued his education in Senior High School at SMA Negeri 1 Belalau which has graduated in 2011. In 2011 until 2012, researcher has continued to an informal education.

In 2012, researcher continued his education in Bachelor Degree for Management Department at Faculty of Economics and Business of University of Lampung through SNMPTN written test. While becoming a student, researcher has been active in various organizations both internal and external. Researcher has joined International Field Study in Malaysia and Singapore. Researcher has once become the athlete who represented the University of Lampung at Pekan Olahraga Mahasiswa Daerah (POMDA) Lampung and became the first champion thus represented the province of Lampung along with other sport branches to compete on the national stage at Pekan Olahraga Mahasiswa Nasional (POMNAS) XIII in Yogyakarta.

DEDICATION

Praise to Allah SWT, for every gifts; faith and islam, *sholawat* and regards for the best *murabbi* modifier civilization of mankind, prophet Muhammad SAW.

By expecting the blessing of Allah SWT, I dedicate this work as a token of love, affection and devotion to:

My beloved mother (Mrs. Asnah Tanjung) and My beloved father (Mr. Bachtiar)

Who have educated and raised me with patience, much love, prays, strengthen, and support for every of my steps towards success.

My Brothers and Sisters

Who always encouraged and reminded that I remain focused in the pursuit research's goals.

Teachers, Lecturers, and Murabbi

Who have helped me in learning to get the knowledge of the world and the hereafter as well as provide motivation for me to be a better human being.

And

My Beloved Almamater

University of Lampung

MOTTO

**“Whoever takes the road in search of
knowledge, Allah will make easy for them
the path to heaven”**

(H.R. Muslim: 2699)

**“The victory in a battlefield is the capital
to face and win in other fields”**

(Zefri Septiabe)

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May Allah SWT return the favor to all those who have provided assistance to the researcher. Hopefully the result of this thesis can provide benefits for all parties, especially in the field of Economics.

Bandar Lampung, April 2017
Sincerely,

Zefri Septiabe

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I. INTRODUCTION

1.1. Background

Today's business development is increasing even though within the economic conditions that tends to be unstable. It has an impact on business competition which keeps higher and sharper, on either domestic or the international market. Every business in the high competition is required to always compete with other companies within the similar industry. One of the ways to be able to win or at least to survive in the competition is by giving full attention to the quality of products which is produced by the company so that it can surpass the products which is produced by competitors (Haslindah, 2013).

Quality problems have led to the company's technique and strategy overall in order to be competitive and able to survive against global competition with other companies' products (Hatani, 2007). Good quality will be produced from the good process and in accordance with the quality standard which has been determined based on market needs. The reality on the field shows that the companies which are successful and able to survive definitely have a program concerning the quality because through good quality program will be able to effectively eliminate waste and increase the competitive ability of companies (Darsono, 2013).

Customer satisfaction factors are directly related to how well the quality of the product or the physical issues received by the consumers. This makes the company must be able to maintain the quality of products or services that is produced even better if the company is able to increase it. Only companies that are able to produce better quality of products or services can compete in the global market. In the global market, the quality largely determines whether a product or service can be accepted (Suradi, 2012).

According to Darsono (2013), despite the production process has been conducted properly, in fact there are still found discrepancies between the produced products and the expected. This is due to discrepancies from various factors, derived from the raw materials, human resources and the performance of machine facilities used in the production process. In order to make the quality of products according to the standards set by the company and in accordance with customer's expectations, the company must do efforts that impact on the produced quality and prevent many damaged or defective products sold to the market.

Product competition makes the tendency of product development process cheaper and better in the quality than the previous product. Consumers will be satisfied when their needs are purchased that the received product is in accordance with the required quality or specification. If it is inappropriate then consumers would switch to similar products from other brands (Nastiti, 2013). According to Suradi (2013), although the company always strives well in generating the expected product, it is still needed to control the quality. Quality control can assist the company in maintaining and improving the quality of its products.

Quality control is held in order to produce a product in the form of goods or services in accordance with the required and planned standards, as well as improve the quality of products that have not been in accordance with the established standards and the maintain appropriate quality (Kaban, 2014). According to Suradi (2013), quality control activities can be started from raw materials, during the production process until the final product and adapted to the standards which are set and enforced by the company.

The product called damaged or defective if it has deviated from the standards that set so it needs proper tools and methods to work on and resolve these issues. The tools that can help to fix or regulate the quality is Total Quality Management (TQM) tools. According to Heizer and Render (2015:254), TQM tools consist of a check sheet, scatter diagrams, cause-and-effect diagrams, Pareto charts, flowchart, histograms, and statistical process control chart.

PT Lampung Intermedia which was established on November 15th, 1996 is a company works in the printing service for Radar Lampung Newspaper. The requirements to become the company's leading quality daily newspaper printing company must maintain the quality of production in order to survive and be able to compete with other daily newspaper printing companies. In fact there is still production that produces damaged product meanwhile Radar Lampung Newspaper printed by PT Lampung Intermedia is in a large amount. The data of production and damaged products of Radar Lampung Newspaper in 2016 by PT Lampung Intermedia can be seen in Table 1.1. in the following.

Table 1.1. The Number of Production and Damaged Products of Radar Lampung Newspaper in 2016

Month	Total Production (copies)	Damage Products (copies)	Damage Percentage (%)
January	1,335,254	26,350	1.97
February	1,107,648	23,700	2.14
March	1,139,173	29,060	2.55
April	1,190,442	24,120	2.03
May	1,130,925	17,600	1.56
June	817,538	15,740	1.93
July	658,307	13,900	2.11
August	818,443	19,320	2.36
September	762,423	21,040	2.76
October	800,999	20,860	2.6
November	756,326	18,780	2.48
December	688,285	22,260	3.23
Grand Total	11,205,763	252,730	-
Average	933,814	21,061	2.26

Source: PT Lampung Intermedia, the processed data

Based on Table 1.1. it can be seen that the number of production or Radar Lampung Newspaper printed by PT Lampung Intermedia is not the equal every month. This is caused by the company in determining the number of copies that produced based on the received order. In addition, based on Table 1.1. we recognize the number of product occurred incomplete or defective is vary. The average production per month of Radar Lampung Newspaper during 2016 was 933,814 copies, with damaged products average up to 21,061 copies each month of the total production of the company.

In 2016, the number of monthly production fluctuates and tends to decrease, especially at the comparison between the production number on January which is as big as 1,335,254 copies and on December as big as 688.285 copies with a far difference that is approximately 51 %. This decreasing of production number is an effect of the decreasing of consumer's demand which is caused by price competition with other companies. The price of one copy of the competitor's newspaper is cheaper than Radar Lampung Newspaper, so the consumers switch to the other brands and Radar Lampung company loses its consumers moreover it affects on the number which will be printed by PT Lampung Intermedia. Beside the main cause, the price of raw materials increase, such as paper price increases 5% per kilogram so it increases the cost of production to the company. One of the efforts of Radar Lampung company to overcome this problem is to decrease the price of one copy Radar Lampung Newspaper which is originally 4,000 IDR to 3,000 IDR with consumer's return as expected.

PT Lampung Intermedia in every production of Radar Lampung Newspaper always consists of damaged products are produced. The number of daily production and damage products as the sample on December which has the biggest damage percentage in 2016 are listed in Table 1.2. below.

**Table 1.2. The Number of Production and Damaged Products Radar
Lampung Newspaper on December 2016**

Production Date	Total Production (copies)	Damaged Products (copies)	Damage Percentage (%)
1	30,027	540	1.8
2	30,038	1,740	5.79
3	18,925	520	2.75
4	16,287	540	3.32
5	30,469	840	2.76
6	30,080	420	1.4
7	30,382	660	2.17
8	30,298	960	3.17
9	30,029	500	1.67
10	17,895	1,320	7.38
11	16,182	1,300	8.03
12	-	-	-
13	30,577	940	3.07
14	30,662	360	1.17
15	30,568	380	1.24
16	19,910	600	3.01
17	18,149	260	1.43
18	16,326	320	1.96
19	19,792	1,800	9.09
20	30,151	760	2.52
21	30,067	520	1.73
22	30,045	1,120	3.73
23	19,793	600	3.03
24	17,694	1,100	6.22
25	-	-	-
26	18,662	780	4.18
27	19,260	620	3.22
28	19,595	580	2.96
29	19,576	600	3.06
30	19,458	720	3.7
31	17,388	860	4.95
Grand Total	688,285	22,260	-
Average	23,734	768	3.23

Source: PT Lampung Intermedia, the processed data

According to Table 1.2. can be seen the average production Radar Lampung Newspaper on December 2016 was 23,734 copies per day with a damage average was 768 copies. Based on Table 1.2. the damage occurred during each production

of the Radar Lampung Newspaper. The types of damages that occur in the production are blur and there are cut parts. Factors that cause damage to the product are machine factor, human, material, method and environment.

The company has no standard reference for production that becomes clear measurement for production quality control, so it is normal that each production has always been a number of damaged product as shown in Table 1.2. the ability of machines that can print on both sides in one press, cut the paper automatically, calculate copies automatically, and the prepared raw materials must be a serious concern because it will affect the production quality.

The company simply take reference on the color (color proof) and the sharpness of the plate as the production standard whereas Prawirosentono (2007:72) explained that various control levels of quality standards should be first determined in accordance with the quality standards that planned like the quality standard of raw materials to be used, the quality of the production process (machines and manpower who implement), the quality of semi-finished goods, the quality of finished goods and administration.

Production quality control program which applied by the company has not been optimal yet, so it is necessary to do research on quality control efforts applied in the printing of Radar Lampung Newspaper and search for the causes that make the persistence of the damages and find the solution. Through the help of using TQM tools, we are able to identify causes that make the persistence of the damages and to find the solution, so that the number of damaged products can be reduced as minimum as possible. It motivates researcher to make the title

"Production Quality Control at Printing Company for Radar Lampung in PT Lampung Intermedia Bandar Lampung".

1.2. Problem Formulation

The formulation of this problem is a summary of the research problem. The formulation of the problem to be addressed in this reasearch as the following.

1. How the implementation of quality control in the production of Radar Lampung Newspaper identifies the damages to the product.
2. What the types of damages are most dominant in the product of Radar Lampung Newspaper.
3. What the dominant factors that cause damages or defects in the production of Radar Lampung Newspaper.

1.3. Restriction of The Problem

This research limits its scope in manufacturing. This means it is seen in terms of the printing. According to Prawirosentono (2009:2), manufacturing means making by hand (manual) or a machine to produce some goods. Besides, this research focuses on the production of Radar Lampung Newspaper which is the routine of PT Lampung Intermedia.

1.4. Research Objectives

The objectives to be achieved from this research are as the following.

1. Knowing the implementation of quality control in the production of Radar Lampung Newspaper by identifying the damage of the product.

2. Identifying the types of damages that occur on the product of Radar Lampung Newspaper.
3. Knowing the factors that cause the damages or defects in the production of Radar Lampung Newspaper.

1.5. Benefits of Research

The results of this research are expected to be useful for:

a. Company

The results of this research can be a useful suggestion for the company in operational processes which describe problems that occur in the production process of Radar Lampung Newspaper and what needs to be improved or done in order to give satisfaction to the consumer in form of the finished product.

b. Researcher

Adding and expanding the knowledge and experience of researcher in applying the theories acquired in the lecture especially those related to quality control and also the researcher graduation requirements as student in majoring management.

II. LITERATURE REVIEW AND FRAMEWORK

2.1. Theoretical Basis

2.1.1 Quality

The meaning or definition of quality has a very wide scope, relative, varying and changing, so the definition of quality has many criteria and is highly dependent on the context, especially when viewed from the side of the consumer's final assessment and the definition which is given by various experts as well as from the view point of producers as the party that creates quality. Consumers and producers are different and will experience different quality in accordance with the quality standards of each. Similarly, the experts in the definition of quality will also be different from each other as they shape it in different dimensions (Darsono, 2013).

For managers of production, quality is based on manufacturing. They believe that quality means in accordance with the standards and make the product correctly at the first time (Heizer and Render, 201:223). According to Prawirosentono (2009:320), the definition of quality of a product are a physical condition, characteristic and usefulness of a product that can give consumer's satisfaction both physically and psychologically, in accordance with the value for money spent.

The concept of quality itself is often regarded as a measure of the relative goodness of a product or service that consists of design and conformity quality. The design quality is a function of product specifications, meanwhile the quality of conformity is a measure of how much a product fulfill the requirements or specifications of a predetermined quality (Tjiptono and Diana, 2003:2). Darsono (2013) explained that a good quality according to the producers were the product produced by the company in accordance with specifications set by the company. Meanwhile a poor quality is when the products are not in accordance with standards specifications which already set and producing damaged products.

Assauri (1999:206) explained that one of the important factors and frequently used by consumers in view of a product at first time to assess the quality of the product is the appearance of goods or products. Although the goods were produced technically or mechanically advance, but when the outer form is retreat or less acceptable then it can cause such goods are not liked by the consumer or the buyer, because the quality is not considered eligible. The outer shape factors that is contained in a product not only determine by the shape, but also color, composition (such as packaging) and other things.

According to Feigenbaum (1996: 7), the quality of products and services are the overall characteristics of the products or services for marketing, engineering, manufacturing, and maintaining that make the products and services to be used prospect or exceed customer expectations. According to Juran in Prawirosentono (2007:5), *quality is fitness for use*, which is translated loosely means the quality of

a product related to the suitability of such goods are used. Then, if a product is decent and used well means the goods have a good quality.

Tjiptono and Diana (2003:3) explained although there is no definition of the quality that universally accepted, but from some of the definitions of quality according to experts said that there are similarities in the elements as the following:

- a. Quality includes an attempt to meet or exceed customer expectations.
- b. Quality includes products, services, humans, processes and the environment.
- c. Quality is an ever-changing conditions (for example what be considered to be the current quality may be considered as lack of quality in the future).

2.1.2 Quality Control

Quality control is performed in order to produce a product in the form of goods or services in accordance with the required and planned standards, as well as improve the quality of products that have not been in accordance with established standards and as possible as maintain appropriate quality (Kaban, 2014). According to Suradi (2013), quality control activities can be carried out start from raw materials, during the production process until the final product and adapted to the standards set and prevailed by the company.

According to Assauri (1999:25), the control and supervision are the activities undertaken to ensure that the production and operation activities are performed in accordance with what has planned, and if there is deviation, the deviation can be corrected, so what is expected can be achieved. According to Prawirosentono

(2007:72), the quality control is integrated activities that start from controlling standard quality of materials, production process standard, semi-finished goods, finished goods, until the delivery of final standard products to consumers in order that the goods (services) which are produced according to planned quality specifications.

Assauri (1999:210) explained what is meant by quality control is to ascertain whether the activities of discretion in terms of quality (standard) can be reflected in the final result. In other words, quality control is an attempt to maintain the quality of produced goods to fit the specifications of the product that has been set based on the discretion of management.

Quality control determines the size, means and other functional requirements of a product and the management to improve product quality, maintaining the already high quality and reduces the amount of material damage. With the existence of quality control, so the companies or producers strive to always improve quality at same low costs even to achieve the same quality at a low cost. To reduce losses due to inspections damage is not limited to the final inspection only, and should also be inspection of the goods being processed (Nastiti, 2013).

Implementation of quality control, all achievements of items checked based on the standards, and all deviations from the standard are recorded and analyzed. All of the findings in this case are used as a feedback to the executive so they can undertake corrective actions for production in the future (Assauri, 1999:210).

2.1.3 Objectives of Quality Control

The objectives of quality control according to Assauri (1999:210) are:

1. In order the produced goods can get to the quality standards that have been set.
2. Ensuring the inspection fees can be as small as possible.
3. Ensuring the cost of the design of products and processes with the use of certain production quality can be as small as possible.
4. Ensuring production costs can be as low as possible.

According to Prawirosentono (2009:322), the objective of quality control are:

- a) Overseeing the implementation of production processes to comply with the plan.
- b) Overseeing the raw materials since received, stored, and unpacked from the warehouse of raw materials.

The main objective of quality control are to get a guarantee that the quality of products or services produced in accordance with the quality standards established by spending an economical cost or as low as possible (Kaban, 2014).

2.1.4 Scope of Quality Control

Prawirosentono (2007:72) explained that the various levels of control of quality standards should be determined first in accordance with the planned quality standards. There are several quality standards that can be set including:

- a) Quality standard of raw materials to be used.

- b) Quality standard of production process (machines and workers who implement it).
- c) Quality standard of semi-finished goods.
- d) Quality standard of finished goods.
- e) Administration standard, packing and shipping of the finished product reaches the consumer.

According to Assauri (1999:210), quality control activities are very wide because all influences on the quality should be included and considered. In broad outline, the quality control can be divided or classified into two levels, they are the supervision during processing and the supervision of the results that have been resolved.

a) The Supervision During Processing

There are many ways of quality control related to an ordered process. The examples of results or samples are taken at the same intervals, and continued with statistical checks to see whether the process started well or not. If it starts incorrectly, then this error information can be forwarded to the original executor for readjustment. Monitoring which is carried out is only on some parts of the process, it may be meaningless if it is not followed by supervision on the other parts. The monitoring on this process is included as an oversight of the materials that will be used for the process.

b) The supervision of the result which have been resolved

Although it has been conducted on the quality control in the process stages, but it can not guarantee that no results are broken, unfavorable, or mixed with good

results. To keep the results which are pretty good or least damaged, not spread or escape from the factory to the consumer or buyer, then it is necessary to control over the final product.

2.1.5 Stages of Quality Control

In general, according to Prawirosentono (2007:74), control or supervision of an integrated quality in a manufacturing company is conducted gradually as the following:

- a) Inspection and quality control of raw materials (raw materials, additional raw materials, and so on).
- b) Inspection of the product as a result of the manufacturing process. This applies to semi-finished goods and finished goods.
- c) Inspection of how the packing and shipping of goods to the consumer.
- d) Machines, workers and other facilities used in the production process must also be supervised in accordance with the standard requirements.

So, overall stages of quality control include the following.

- a) Inspection of the quality of raw materials, the quality of materials during the process, and the quality of the finished products. Similarly, the inspection of the amount and composition standard.
- b) Inspection illustrates that whether the production process runs as it has been standardized or not.
- c) Conducting analysis of the facts to determine the deviations that may occur.

- d) When a deviation occurs, it should immediately be corrected so that the product fulfills the planned standards.

In general, quality control can be described as gradual inspection activities begin from observing and gathering facts, then performing the necessary actions.

2.1.6 Total Quality Management

According to Heizer and Render (2011:226), Total Quality Management (TQM) refers to the suppression of quality including the organization entirely from the supplier to the customer. TQM is a management of the whole organization so it is superior in every aspect of goods and services that are important to the customers. While Tjiptono and Diana (2003:4) explained that Total Quality Management is an approach to run a business that tries to maximize organizational competitiveness through continuous improvement of the products, services, human, processes, and environment.

2.1.7 Total Quality Management Tools

There are seven tools used in TQM as shown in Figure 2.1. in the following.

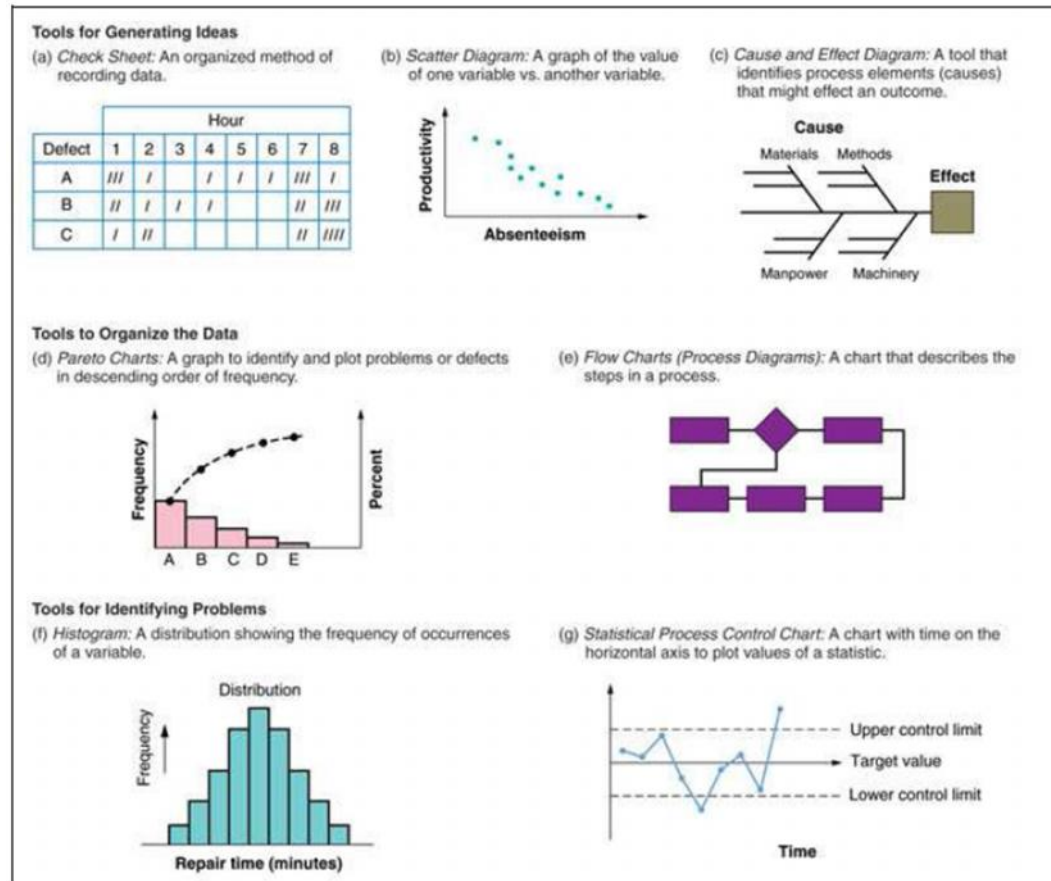


Figure 2.1. Seven Tools of TQM

Source: Heizer and Render (2011)

Besterfield (2004:75) explained that Total Quality Management tools and techniques are divided into categories of quantitative and non quantitative. The quantitative ones are statistical process control (SPC), acceptance sampling, reliability, experimental design, Taguchi's quality engineering, failure mode and effect analysis (FMEA), and quality function deployment (QFD). The non quantitative ones are ISO 9000, ISO 14000, benchmarking, total productive maintenance (TPM), management tools, quality by design, products liability, and information technology.

Methods of Statistical Quality Control are very useful as a tool for quality controlling (Prawirosentono, 2009:322). Statistical Quality Control (SQC) is a branch of Total Quality Management which is defined the collection, analysis, and interpretation of data for use in quality control activities. Statistical Process Control (SPC) and acceptance sampling are the two major parts of SPC (Besterfield, 2004:2). SPC is powerfull collection of problem-solving tools useful in achieving proccess stability and improving capability through the reduction of variability (Srinivasu, 2011). Statistical Process Control (SPC) is comprised of seven tools are pareto diagram, cause and effect diagram, check sheets, process flow diagram, scatter diagram, histogram, and control chart (Besterfield, 2004:75).

2.1.7.1 Check Sheet

Check Sheet is a collecting device and data analyzer presented in form of tables containing data on the number of produced goods and the type of mismatch along with the produced amount (Kaban, 2014). The main purpose of check sheets is to ensure that the data are collected carefully and accurately by operating personnel for proccess control and problem solving (Besterfield, 2004:81).

Kaban (2014) explained the benefits of check sheet is used as a tool for:

- a. Facilitating the collection of data, especially to determine how a problem occurs.
- b. Collecting data on the type of problem that is happening.
- c. Compiling data automatically so that it is easier to collect.
- d. Separating between opinions and facts.

2.1.7.2 Scatter Diagram

Scatter diagram or also called as correlation chart is a graph showing the relationship between two variables on whether the relationship between these two variables is strong or not that is among the factors that influence the process with the quality of the product. Basically the scatter diagram is a tool of interpretation of the data used to test how strong the relationship between two variables is and determine the type of relationship, whether positive, negative, or no relationship. Two variables those are shown in the scatter diagram can be strong characteristics and influencing factors (Kaban, 2014).

2.1.7.3 Cause and Effect Diagram

A cause and effect diagram is picture composed of lines and symbols designed to represent a meaningful relationship between an effect and its causes. Cause and effect diagram frequently called “fishbone diagrams” because of their shape (Besterfield, 2004:78-79). In addition, we can also look at the more detailed factors that influence and have the effect on the major factors that can be seen from the arrows shaped as fishbone in the fishbone diagram (Kaban, 2014).

The operations manager starts with four categories are material, machinery or equipment, manpower, and methods. These four Ms are the “cause” (Heizer and Render, 2011:233). Meanwhile, Yuliyarto and Putra (2014) explained the factors that affect and cause damage to the product is generally as the following.

a. Man (Human)

The workers who perform the work that is involved in the production process.

b. Material (Raw Material)

Everything that is used by companies as a component of the product to be manufactured, consisting of the main raw materials and additional raw materials.

c. Machine

Machines and various equipments used in the production process.

d. Method

Work instructions or work orders to be followed in the production process.

e. Environment

The circumstances surrounding companies that directly or indirectly affect the company in general and influence the production process in specific.

Kaban (2014) explained the uses of a cause and effect diagram are:

- a. Helps to identify the root of the problem cause.
- b. Analyses the actual conditions that aim to make better the quality improvement.
- c. Helps to generate ideas for the solution of a problem.
- d. Assists in the further fact-finding.
- e. Reduces the conditions that cause product incompatibility with consumer complaints.
- f. Determines the standardization of ongoing or implemented operations.
- g. Plans for corrective action.

A cause and effect are the means of picturing all these major and minor causes (Besterfield, 2004:79). According to Kaban (2014), the steps in making a cause and effect diagram are as the following.

- a. Identify the main problem.
- b. Place the main problem on the right side of the diagram.
- c. Identify the minor causes and put it on the main diagram.
- d. Identify the causes of minor and put it on the major causes.
- e. The diagram has been completed, then performed an evaluation to determine the real cause.

2.1.7.4 Pareto Charts

Pareto charts are a method of organizing errors, problem, or defect to help focus on problem-solving efforts (Heizer and Render, 2011:233). A Pareto diagram is a graph that ranks data classifications in descending order from left to right (Besterfield, 2004:76). A Pareto chart is used to highlight the most frequently occurring defects, the most common cause of defects, or the most frequent causes of customer complaints (Awaj, 2013).

Steps to make a Pareto Charts according to Amri (2008) are as the following:

- a. Identify the inappropriate types.
- b. Determine the frequency for different categories of incompatibility or disability.
- c. Sort the list in descending order on its incompatibility frequency.
- d. Calculate the cumulative frequency.
- e. Make a scale and spread the Pareto frequency bar.

2.1.7.5 Flowcharts

Flowcharts graphically present a process or system by using grids and lines which are interconnected. This diagram is quite simple, but it is an excellent tool to understand a process or to explain the steps of a process (Heizer and Render, 2011:234).

2.1.7.6 Histogram

Histogram is a frequency distribution shows how often each different value in a set of data occurs. A histogram is the most commonly used graph to show frequency distributions (Fonseca, 2015). Histogram shows the characteristics of the data which are divided into classes (Kaban, 2014). According to Besterfield (2004:131), the histogram describes the variation in the process. It is used to:

- a. Solve problems.
- b. Determine the process capability.
- c. Compare with specifications.
- d. Suggest the shape of the population.
- e. Indicate discrepancies in data such as gaps.

2.1.7.7 Control Chart

Control chart is a chart guiding in the quality control (Prawirosentono, 2009:322). Control chart are graphic presentations of data over time that show upper and lower limits for the process we want to control (Heizer and Render, 2011). According to Fonseca (2015), the control chart is a graph used to study how a process changes over time and to identify if a process is statistical control (subject to normal causes or variation) or not (subject to special causes of variation).

According to Prawirosentono (2009:323), in general, control chart is used to obtain the following informations.

- a. The ability of the production process, means that whether the machines are still running well according to plan or not.
- b. Quality control of the final product, so that the final product quality remains good accordance to standard.

Yuliyarto and Putra (2014) explained that the control chart is used to help detect any deviations by setting control limits:

- a. Upper control limit (UCL)

It is an upper boundary line to a deviation which is still allowed.

- b. Central line (CL)

It is the line that symbolizes the absence of deviation of the sample characteristics.

- c. Lower control limit (LCL)

It is a lower limit lines for a deviation of the sample characteristics.

Prawirosentono (2009: 322-323) explained that in order to control the quality there will be controllable things, but there are uncontrollable things. If samples shows the specification limits means it is good. Otherwise, if samples show the outside area of standard specification means that samples much out of quality. This means that the production process needs to be fixed.

The control chart can be divided into two groups according to the types of data, they are control chart for variable data and control chart for attribute data (Kartika, 2013).

1. Control Chart for Variables

According to Heizer and Render (2011:252), control chart variables are those that have continuous dimensions. They have an infinite number of possibilities. Examples are weight, speed, length, or strength. Control chart for variables are divided into two, they are average control chart (\bar{x} chart) and range control chart (R chart).

2. Control Chart for Attributes

The control charts for attributes are p-chart, np-chart, c-chart and u-chart. Control charts for defectives are p and np charts. P charts are used when the sample size is constant and np charts are used when the sample size is variable (Shinde and Magar, 2014). According to Handes et al. (2010), control chart p is used to control the proportion of items that do not qualify the specifications set which means it is categorized as defect.

2.2 Previous Research

The previous research that becomes a references are listed in Table 2.1. and completed with columns of research title, variables, analysis tools, and the result in the following table.

Table 2.1. Summary of The Previous Research

No.	Researcher	Title	Variables	Analysis Tools	Results
1.	Darsono (2013)	Analisis Pengendalian Kualitas Produksi dalam Upaya Mengendalikan Tingkat Kerusakan Produk	Deviation or damage of the company production	Using check sheet, histogram, control chart p, statistical tests of the damage level of the output, and Pareto Chart.	The results of the research showed that the average damage level of production did not exceed the standards set by the company, Pareto Chart showed that the kind of broken that often occurred was broken because the color did not match, and showed that the quality control activity in layers could reduce the level of defective production.
2.	Hatani (2007)	Manajemen Pengendalian Mutu Produksi Roti Melalui Pendekatan Statistical Quality Control (SQC)	Deviation of product quality standards set by the company	Statistical Quality Control (SQC) by control chart p (P-charts) method	The results analysis showed that the level of standards expected by the company had not been achieved because the average proportion of sampled products that were damaged or defective was still outside the tolerance limit of defective product.
3.	Yuliyarto and Putra (2014)	Analisis Quality Control Pada Produksi Susu Sapi di CV Cita Nasional Getasan Tahun 2014	Damage of product in the production	Statistical Quality Control (SQC) by methods of check sheet, Pareto Chart, fishbone diagram, and control chart p	The research concluded that improvement priorities that need to be done by the company to suppress or reduce the number of damage because of leaky packaging and distribution. From the analysis of cause-effect diagram known that the factors causing the damage came from human factors, methods, materials, machines, and work environment.
4.	Muktiadji and Hidayat (2006)	Pengendalian Kualitas Produk dengan Metode	Damage occurs in the production	Statistical Quality Control (SQC) by method of	This research showed in September to December there were still products beyond the control of

Tabel 2.1. (continued table)

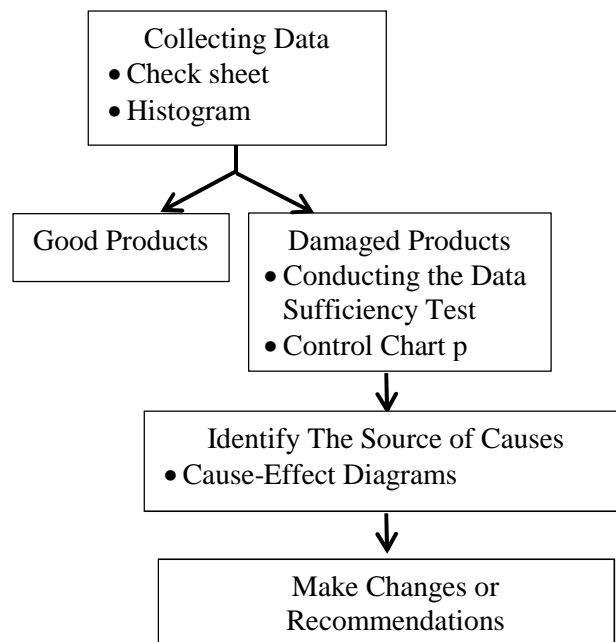
No.	Researcher	Title	Variables	Analysis Tools	Results
		Control Chart Pada PT XYZ	of clothes	control charts and fishbone diagram	depicting a defective product. From the analysis of cause-effect diagram can be seen the factors causing the damage came from human factors, methods, materials, machines, and environment.
5.	Rendy Kaban (2014)	Pengendalian Kualitas Kemasan Plastik Pouch Menggunakan Statistical Proccess Control (SPC) di PT Incasi Raya Padang	Damage of the plastic pouch	Statistical Processing Control (SPC) by method of check sheet, flowchart, fishbone diagram, and control chart p	The results of data processing showed <i>reject production</i> packaging that were outside the control limits. Of all types of packaging, only one or two months of <i>reject production</i> amount of packaging that were within the control limits. This showed that the dominant monthly <i>reject production</i> packs are outside the control limits. The <i>reject production</i> was analyzed using a cause-effect diagram. Factors that affected the rejected packaging production was based on the analysis are human, machines, environment, materials, and methods in the enterprise.
6.	Nastiti (2013)	Analisis Pengendalian Kualitas Produk dengan Metode Statistical Quality Control (Studi Kasus pada PT “X” Depok)	Damaged products or deviate from the standards that has been set by the company	Statistical Quality Control (SQC) by control chart (p chart) method	This research shows the quality of the product was still inside the Upper Control Limit (UCL) and Lower Control Limit (LCL) of deviations that are generated based on the analysis SQC.
7.	Bakhtiar, S, Tahir, and Hasni (2013)	Analisis Pengendalian Kualitas dengan Menggunakan Metode Statistical Quality Control (SQC)	Damaged product on the syrup bottle	Statistical Quality Control (SQC) by the methods of check sheet, histogram, Pareto Diagram, cause-effect diagrams, scatter diagrams, control chart p, conducting the data sufficiency	This research shows the damage on the broken and cracked bottle caused by four factors: human, material, method and process. Preventive actions that can be done from the human factor are providing direction and conducting strict supervision and conducting training on employees, the material factor is the bottle to be used

Tabel 2.1. (continued table)

No.	Researcher	Title	Variables	Analysis Tools	Results
				test	should be treated properly, method factor is that the warehouse area should be closed so that the bottle is not exposed to direct sunlight, and factor of the process is not too long soaking the bottles in hot water, so as not to reduce the durability of the bottles.

2.3 Framework

Here is a framework figure in this research:

**Figure 2.2. Framework**

Source: Tjiptono and Diana (2003)

The framework above is used by researcher as a guide to measure or to know how to do the research. So it is important to make recommendations for the company.

III. RESEARCH METHODS

3.1 Location of Research

This research was conducted at PT Lampung Intermedia located on Sultan Agung Street No. 18, Subdistrict Way Halim, Bandar Lampung.

3.2 Types and Sources of Data

3.2.1 Types of Data

The types of data in the form of quantitative and qualitative data. Quantitative data is the data that contain numbers on the amount of production and damage. Qualitative data is the data which contain information regarding the profile of the company, the types of damage, the cause of the damage, machines, and the use of raw materials. Types of data overall obtained from the company that becomes the place of research. Quantitative data are obtained from documents or records administration. Qualitative data are obtained from interviews and direct observation in the company.

3.2.2 Sources of Data

The data used in this research are primary data which are data obtained by observing and interviewing, on other hand, secondary data which are obtained by collecting documents from PT Lampung Intermedia which is the place of research.

3.3 Data Collecting Methods

Data collecting methods used in this research is done by conducting direct observation in the company that became the object of research. Methods of data collection is carried out as the followings:

3.3.1 Interviews

Interview is a technique that uses oral questions to collect data to the subject of research (Sanusi, 2011:105). In this case the researcher conducted interviews with the manager and employees of PT Lampung Intermedia regarding the damaged product and its causes, the production process and raw materials used.

3.3.2 Observations

Observation is a way of collecting data through the process of recording the behavior of the subject (person), objects (things) or systematic occurrences without question or communication with observed individuals (Sanusi, 2011:111).

The researcher conducted direct observation and monitoring in the research at PT Lampung Intermedia by examining the systems and the work of the personnel,

observing the production process from the beginning to the end, and studying the quality control activities.

3.3.3 Documentation

The way of documentation is usually done to collect secondary data from various sources, both personal and institutional, such as financial reports, the recapitulation of personnel, organizational structure, regulations, production data, wills, life history, company history, and so on, are usually available in the location of research (Sanusi, 2011:114). In this study, the researcher learned the documents of the company in the form of production activity report, the number of production and damaged products report, work plans, and personnel documents.

3.4 Data Analysis Methods

The processing of the data which is gained can use the help of the tools of quality control. The steps are as follows.

3.4.1 Collecting Data by Using *Check Sheet*

Check sheet or examination sheet is a flotation device and analyzer data presented in the form of tables containing data on the number of produced goods and the type of mismatch along with the produced amount (Kaban, 2014). In this study, the data obtained from the company, especially in the form of production data and product damage data, later presented in a neat and structured tabular form using a check sheet. This is done in order to make it easier to understand the data so that it can be further analyzed.

3.4.2 Histogram

Data needs to be presented in a histogram which is the form of data presentation tool visually shaped as bar graph showing the distribution of the value obtained in the form of numbers to make it easier to read or explain the data quickly (Bakhtiar, 2013).

3.4.3 Conducting The Data Sufficiency Test

Before processing the data that has been collected, firstly the researcher did the data sufficiency test to determine whether the amount of the captured data is enough for research material (representative). This was done because the retrieval of data uses a sample (Amri, 2008). Bakhtiar (2013) described the formula that is used in the data sufficiency test is as follows.

$$N' = \frac{(Z)^2 (\bar{p}) (1-\bar{p})}{(\alpha)^2}$$

Information:

N' = The number of proper samples

Z = Values in the table Z with a certain confidence level

\bar{p} = Average mismatch per unit

α = The level of accuracy

If the number of samples that have been used (N) is more than or equal to the number of proper samples (N'), then the number of the used samples used is sufficient to be used in the calculation of control limits. However, if the number of samples that have been used (N) is less than the number of proper samples (N'),

then the number of taken samples is not sufficient so it needs more sampling to overcome these deficiencies.

3.4.4 Creating Control Chart p

Control chart p is used to help detecting any irregularities by setting up control limits (Yuliyarto and Putra, 2014). Tampubolon (2014:114-115), Darsono (2013), and Bakhtiar (2013) described the steps to create a control chart p as follows.

a. Calculating Percentage of Damage

$$p = \frac{pn}{n}$$

Information:

n : Number in the sub group inspection

pn : Number of damage in the sub group

Subgroup: Day -

b. Calculating Central Line (CL)

The central line represents the average of product damage (\bar{p}).

$$CL = \bar{p} = \frac{\sum np}{\sum n}$$

Information:

$\sum np$: Total of damage

$\sum n$: Total of inspection

c. Calculating Upper Control Limit (UCL)

To calculate the upper control limit or UCL is carried out by the formula:

$$UCL = \bar{p} + 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

Information:

\bar{p} : Average mismatch of products

n : Total of production

d. Calculating Lower Control Limit (LCL)

To calculate the lower control limit or LCL is done by the formula:

$$LCL = \bar{p} - 3 \sqrt{\frac{\bar{p}(1-\bar{p})}{n}}$$

Information:

\bar{p} : Average mismatch of products

n : Total of production

Note: If $LCL < 0$, so LCL is considered = 0

3.4.5 Looking for The Cause Factors by Cause and Effect Diagram

The process by this causal diagrams is an to illustration to a causal relationship (Suradi, 2012). Having in mind about the main problem which is the most dominant, then we do the analysis of the factors causing damage to the product by using fishbone diagrams (cause and effect diagram) so that it can be known what factors are becoming the dominant cause of product damage.

3.4.6 Making Recommendations / Improvement Proposals

Once known the causes of damage to the product, then it can be arranged to a recommendation or a proposal of measurement for improvement of product quality.

V. CONCLUSION, SUGGESTION, AND LIMITATION OF RESEARCH

5.1. Conclusion

Based on the analysis result of the data that has been processed and discussed the production of Radar Lampung Newspaper in PT Lampung Intermedia, therefore the researcher can make the following conclusions.

1. Implementation of quality control in manufacturing Radar Lampung Newspaper based on production data which have been obtained and processed in PT Lampung Intermedia, there has been known about the number of production of Radar Lampung Newspaper on December 2016 is 688,285 copies with the damaged product that occur in the production of 22,260 copies. Average damaged products in every production is 3.23%. This value is compared to the limit percentage of damaged products in every production activities of Radar Lampung Newspaper as big as 5% is not yet out of the standard, although in recent times of the production of damage that exceeds 5% of total production. The calculation result of control chart p shows that the production process is not all in the specified control limit, even it tends to be controlled because the points fluctuate disorderly and are out of the upper control limit indicating that the process is in a state of impropriety. In the check sheet and histogram, it shows five

points that exceed the standard of damage limit. However, the statistical tools to control chart p in the quality control of products to identify that product quality is outside the upper control limit as much as nine points, so that it can be said that the uncontrolled process apparently shows the high deviation occurs.

2. In general, the types of damage that is dominant in the product in Radar Lampung Newspaper happening are the blur, unregistered / imprecised, asymmetrical folds, and clipped.
3. Dominant factors that cause damaged products are caused by human factors (worker or operator), the used production machine, the working method, the used raw materials and the work environment.

5.2. Suggestion

1. The company must implement appropriate and systematical production system by implementing production quality control program to be able to know the kind of damage that often occurs and the causing factors. Thus, the company can immediately take preventive measures to reduce the occurrence of product defects.
2. The company can make the quality improvements by focusing improvements on the type of the damaged products having large amounts or dominant in production are the blur, unregistered / imprecised, asymmetrical folds, and clipped.

3. Improving the quality refers to the dominant factors that cause damaged products are the human factor, machines, methods, materials and the environment so that the improvement can be comprehensive.

5.3. Limitations of Research

In general the types of product damage on Radar Lampung Newspaper happening are the blur, unregistered / imprecised, asymmetrical folds, and clipped. However, each type of damage is not recorded by the company so that researcher unable to know what kind of damage is greatest. Yet by knowing the types of greatest damage, the company can perform priority control.

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