IMPLEMENTATION OF QUALITY TOOLS IN SMALL MEDIUM INDUSTRY

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SUPERVISOR DECLARATION

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STUDENT DECLARATION

I hereby declare that this thesis entitled *"Implementation of Quality Tools In Small Medium Industry"* is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Dedicated to my beloved Mother, Father, Sister and Brothers

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ABSTRACT

Quality tools are one of the methods used to control and improve productivity by many ways such as reducing the repetitive mistake. Quality plays such an important role in the manufacturing industry in order to raise the profit of the company and also the company's name. SMI has many problems in their company specifically in the processing line. This is because they just focusing in producing the products and not taking the lack occur in the processing very well. This study is about to apply the quality tools in the processing line in order to identify where the highest waste is occur at and to give suggestion for improvement at the major waste involves in the processing line. The selected SMI is producing spice which is one of important ingredients in Malaysian food. There are four stages for producing spice, weighing, roasting, grinding and packaging. Due to the interview there are two causes contribute to waste, which are roasting and grinding process. From the data taken and the analysis done, it shows the highest waste occur in the grinding process which cause by four factors, expose to the moving fan, spices stick at the grind blade, rotating gear and tupperware without lid. This shows that quality tools managed to find the highest waste occur in the processing line. The company can reduce the waste by put on the lid on the table used for cooling the spice, service the grinding blade once after running three time to avoid the wet spices will attract more spices to stick together, build a compartment at the rotating gear as obstacle and put on the lid on the tupperware to ensure the spice will not getting away from the tupperware.

ABSTRAK

Perkakas kualiti merupakan salah satu kaedah digunakan untuk mengawal dan menigkatkan produktiviti dengan banyak cara antaranya mengurangkan kesilapan yang berulang. Kualiti memainkan peranan penting bagi syarikat pembuatan untuk meningkatkan keuntungan dan menaikkan nama syarikat. SSK mempunyai banyak masalah di dalam syarikat mereka terutamanya di bahagian pemprosessan. Ini adalah kerana mereka hanya fokus dalam penghasilan produk dan tidak mengambil kekurangan di bahagian pemprosessan dengan baik. Pengkajian ini adalah tentang menggunakan perkakas kualiti di bahagian pemprosessan untuk mencari dimanakah berlakunya pembaziran yang tertinggi dan untuk memberi cadangan bagi meningkatkan kawasan pembaziran major yang terlibat. SSK yang terpilih menghasilkan rempah yang mana merupakan salah satu ramuan yang penting dalam masakan orang Malaysia. Ada empat perigkat bagi menghasilkan rempah, timbang berat, panggang, mengisar dan mempaket. Berdasarkan temubual ada dua penyebab yang menyumbangkan pembaziran, yang mana adalah panggang dan mengisar. Daripada data yang diambil dan analisis yang dijalankan, ia menunjukkan pembaziran yang tertinggi berlaku di proses mengisar yang mana disebabkan oleh empat faktor, terdedah kepada kipas yang bergerak, rempah melekat pada mata pengisar, gear yang berpusing dan bekas tanpa penutup. Ini menunjukkan perkakas kualiti berjaya mencari pembaziran tertinggi yang berlaku di bahagian pemprosessan. Syarikat tersebut boleh mengurangkan pembaziran dengan meletakkan penutup pada meja yang digunakan untuk menyejukkan rempah, servis mata pengisar sekali selepas menggunakan tiga kali untuk mengelakkan rempah yang lembab menarik lebih banyak rempah yang melekat, membina pengkotak pada gear yang bergerak sebagai penghalang dan meletakkan penutup pada bekas bagi mengelakkan rempah terkeluar.

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CHAPTER 1

INTRODUCTION

1.1 Background

Quality tools are the methods use to analyze and improving products. One of the objectives of quality tools is less variation in the product. The phrase less variation is a relative one. Less than a product that has more variation. To create a quality product, we minimize the variation in the specification of the product. Thus quality also could mean reliability. This implies that quality product tend to be more reliable. Quality has several major business advantages. Some of them are quality builds customer loyalty, profits margins can be sustained, plus a better impression helps expand the customer base. In the long run, quality will reduce the operating costs and increase profits. Quality also means larger business profit as the company can eliminate or reduce waste. There is a great deal of profit to make by quality improvements in products and services, business processes and people. The purpose of quality management is to set up a quality and management discipline that prevents defects from happening in company's performance cycle. To accomplish this, a company has to act now in situations that may cause problems later. Quality must be measured in order to manage it. The company must measure the results of how every part of their company is doing at providing internal and external customers with what they want. Whatever measure they choose should work for each department so that they can understand and asses the impact of individual decisions on the company as the whole and on their customers. The place that has related with this topic is exactly in industries field. This is because every product the companies' producing is always connecting with the customers, who buy and use it. In order for becoming super branded goods, the companies need to have the characteristics of customer's demands and requirements in order to satisfy the customer. [Shah, 2004]

1.2 Why SMI

SMI stands for Small Medium Industry. Even though some of SMI is already old in the industry but this company have such problem and difficulties which are still unsolved such as the improper environment of working area, continuous waste in the processing area and etc. These situations occur because there is no professional position in the company. such as an engineer to monitor and solve problems in the processing line. All of the employees are consist of non educational people. This company also have limitation budget. The company just wants the effective method with the low cost to overcome the problem.

1.3 Scope of the project

This project is about to implement the quality tools in the selected SMI. The selected SMI is PJ FOOD which located at Kuantan, Pahang. The company is producing spices, which is one of the most important ingredients in Malaysian food. The study is focusing in the processing line. There are four stages in the processing line which are including weight measuring, roasting, grinding and packaging. According to the observation, the final weight produces after all the processes are not exactly or approximately to the expectation value, which is less than expected. Quality tools will be implement in the processing line of this SMI in order to find where the highest waste is occur at what process area, among those processes. This proposal will give such a comprehensive ideas on how to reduce the waste by finding and analyzing the causes occurs in the processing line.

1.4 Problem statement

i. In order to reduce waste in processing line major defect must be identify and measure at first. The most significant root of waste need to be eliminated.
ii. Processing line of food production is needed to be study and analyze.

1.5 Objective

i. To identify and suggest improvement for the major defects involve in the processing line.
ii. To applied the quality tools in processing line.

CHAPTER 2

LITERATUREVIEW

2.1 Definition of quality

Quality is defined as a degree or grade of the excellence of the product. In the manufacturing industry it is commonly stated that "Quality drives productivity." Improved productivity is a source of greater revenues, employment opportunities and technological advances. Objective of quality is to compliance of a process or its outcome with a predetermined set of criteria, which are presumed essential to the ultimate value it provides. Quality means less variation in the product. The phrase less variation is a relative one. Less than a product that has more variation. To create a quality product, we minimize the variation in the specification of the product. Thus quality also could mean reliability. This implies that quality product tend to be more reliable. Quality has several major business advantages. Some of them are quality builds customer loyalty, profits margins can be sustained, plus a better impression helps expand the customer base. In the long run, quality will reduce the operating costs and increase profits. Quality also means larger business profit as the manufacturer can eliminate or reduce waste. Quality is also demanding, difficult, never ending effort to improve worse. There is a great deal of profit to make by quality improvements in products and services, business processes and people. The purpose of quality management is to set up a quality and management discipline that prevents defects from happening in manufacturer's performance cycle. To accomplish this, a manufacturer has to act now in on situations that may cause problems later. Quality must be measured in order to manage it. The manufacturer must measure the results of how every part of their company is doing at providing internal and external customers with what they want. [Juran and Godfrey, 1999]

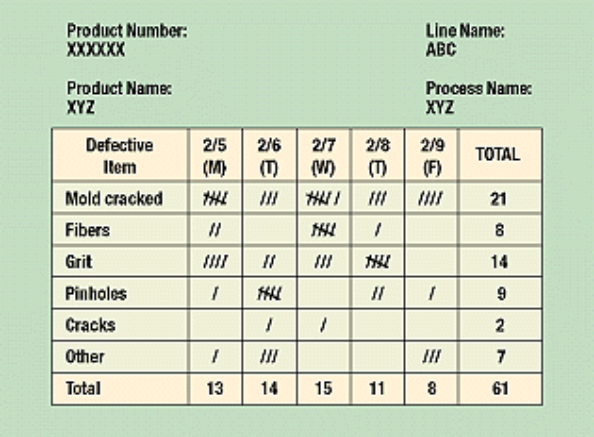
2.2 Seven basic quality tools

Once the basic problem-solving or quality improvement process is understood, the addition of quality tools can make the process proceed more quickly and systematically. Seven simple tools can be used by any professional to ease the quality improvement process: flowcharts, check sheets, Pareto diagrams, cause and effect diagrams, histograms, scatter diagrams, and control charts. (Some books describe a graph instead of a flowchart as one of the seven tools).

The concept behind the seven basic tools came from Kaoru Ishikawa, a renowned quality expert from Japan. According to Ishikawa, 95% of quality-related problems can be resolved with these basic tools. The key to successful problem resolution is the ability to identify the problem, use the appropriate tools based on the nature of the problem, and communicate the solution quickly to others. Inexperienced personnel might do best by starting with the Pareto chart and the cause and effect diagram before tackling the use of the other tools. Those two tools are used most widely by quality improvement teams. [Gitlow, Oppenheim, Levine, 2005]

2.2.1 Check sheet

Check sheets help organize data by category. They show how many times each particular value occurs, and their information is increasingly helpful as more data are collected. More than 50 observations should be available to be charted for this tool to be really useful. Check sheets minimize clerical work since the operator merely adds a mark to the tally on the prepared sheet rather than writing out a figure (Figure 2.1). By showing the frequency of a particular defect (e.g., in a molded part) and how often it occurs in a specific location, check sheets help operators spot problems. The check sheet example shows a list of molded part defects on a production line covering a week's time. One can easily see where to set priorities based on results shown on this check sheet. Assuming the production flow is the same on each day, the part with the largest number of defects carries the highest priority for correction.



Product Number: XXXXXX

Line Name: ABC

Product Name: XYZ

Process Name: XYZ

Defective Item	2/5 (M)	2/6 (T)	2/7 (W)	2/8 (T)	2/9 (F)	TOTAL
Mold cracked	𝍸	///	𝍸 /	///	////	21
Fibers	//		𝍸	/		8
Grit	////	//	///	𝍸		14
Pinholes	/	𝍸		//	/	9
Cracks		/	/			2
Other	/	///			///	7
Total	13	14	15	11	8	61

Figure 2.1.Because it clearly organizes data, a check sheet is the easiest way to track information.

2.2.2 Pareto chart

Pareto Chart is a special type of bar chart where the plotted values are arranged from largest to smallest. A Pareto chart is used to highlight the most frequently occurring defects, the most common causes of defects, or the most frequent causes of customer complaints.

The Pareto chart is named for Vilfredo Pareto and his principle of the "80/20 rule." That is, 20% of the people contain 80% of the wealth; or 20% of the product line may generate 80% of the waste; or 20% of the customers may generate 80% of the complaints, etc.

For example, the hotel management wants to investigate causes of customer dissatisfaction at your hotel chain so investigate and record customer reasons for their complaints.

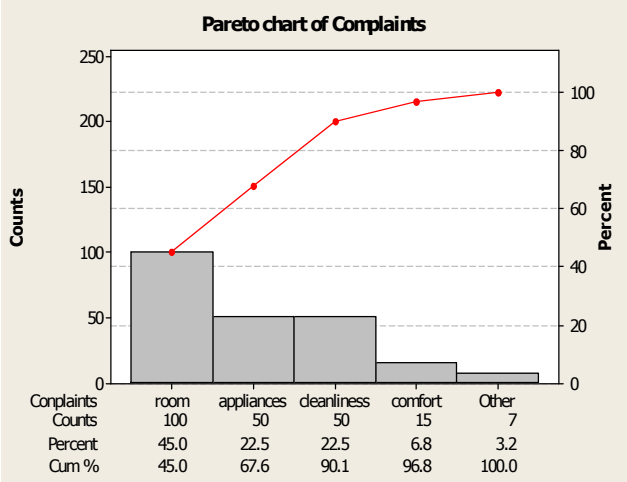


Figure 2.2.Typically the left y-axis is frequency of occurrence, and the right y-axis is the cumulative percentage of the total number of occurrences.

The x-axis displays the categories of defects, complaints, waste, etc.

2.2.2.1 Weighted Pareto Chart

A weighted Pareto chart not only considers the frequency of occurrence, but the importance as well. A weighted Pareto chart can account for the severity of the defects, or the cost, or anything else you would like to track. For example, suppose you have 5 coating defects that you are tracking: wrinkles, stains, scratches, dirt specs, and bubbles.

Collect data on the frequency of defect occurrence and the cost to rework. A weighted Pareto chart may change your priority for improvement projects by considering data based on both cost and frequency data. For example, even though wrinkles may be more frequent they are less expensive to fix than dirt specs, which are a rarer occurrence. Considering both cost and frequency will give you a better understanding of your cost of poor quality (COPQ).

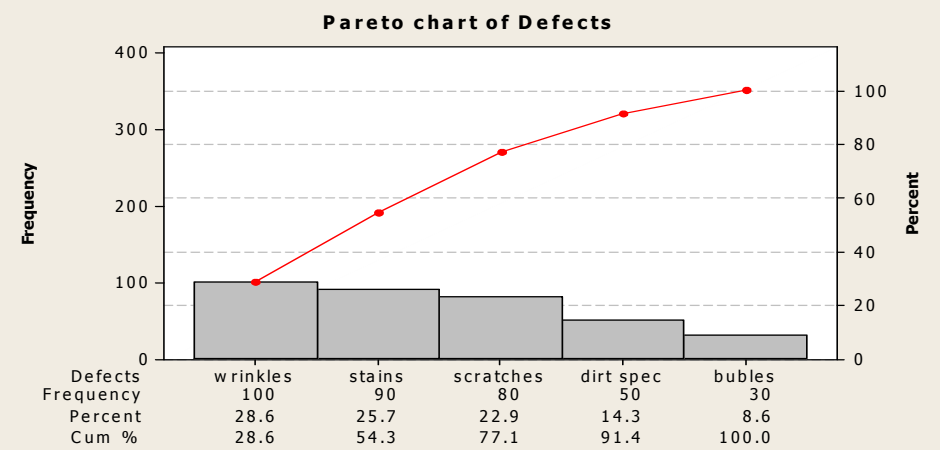


Figure 2.3.The most frequently occurring defects are wrinkles and stains. Based just on this information, it can decide to develop an improvement project around reducing wrinkles and stains [Gitlow, Oppenheim, Levine, 2005]

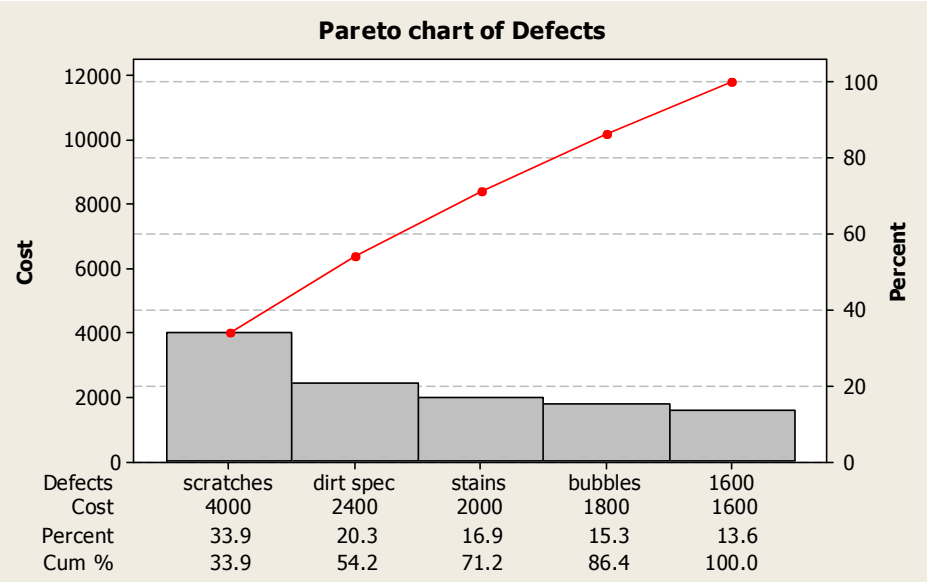


Figure 2.4.The most costly defects are scratches and dirt specs. Based on this more informative data, it can decide that it is better to develop an improvement project to reduce scratches and dirt specs [Gitlow, Oppenheim, Levine, 2005]

2.2.3 Cause and effect diagram

The cause and effect diagram is sometimes called an Ishikawa diagram after its inventor. It is also known as a fish bone diagram because of its shape. A cause and effect diagram describes a relationship between variables. The undesirable outcome is shown as effect, and related causes are shown as leading to, or potentially leading to, the said effect. This popular tool has one severe limitation, however, in that users can overlook important, complex interactions between causes. Thus, if a problem is caused by a combination of factors, it is difficult to use this tool to depict and solve it.

A fish bone diagram displays all contributing factors and their relationships to the outcome to identify areas where data should be collected and analyzed. The major areas of potential causes are shown as the main bones, e.g., materials, methods, people, measurement, machines, and design (Figure 2.5). Later, the subareas are depicted. Thorough analysis of each cause can eliminate causes one by one, and the most probable root cause can be selected for corrective action. Quantitative information can also be used to prioritize means for improvement, whether it is to machine, design, or operator.

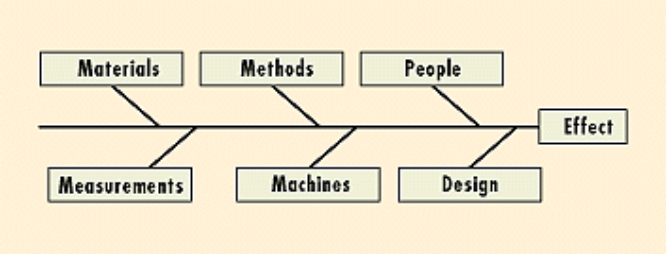


Figure 2.5.Fish bone diagrams display the various possible causes of the final effect. Further analysis can prioritize them

2.2.4 Conclusion of 7 Basic Quality Tools

Many people in the medical device manufacturing industry are undoubtedly familiar with many of these tools and know their application, advantages, and limitations. However, manufacturers must ensure that these tools are in place and being used to their full advantage as part of their quality system procedures. Flowcharts and check sheets are most valuable in identifying problems, whereas cause and effect diagrams, histograms, scatter diagrams, and control charts are used for problem analysis. Pareto diagrams are effective for both areas. By properly using these tools, the problem-solving process can be more efficient and more effective.

Those manufacturers who have mastered the seven basic tools described here may wish to further refine their quality improvement processes. A future article will discuss seven new tools: relations diagrams, affinity diagrams (K-J method), systematic diagrams, matrix diagrams, matrix data diagrams, process decision programs, and arrow diagrams. These seven tools are used less frequently and are more complicated.

2.3 Implementation of the Quality tools in previous case

2.3.1 Seven Basic of Quality Tools (Pareto chart)

Statistical Thinking to Improve Quality of Machining

The application of Pareto chart in a case study from Gijo (2005). A company was experiencing a high rejection rate in one of its machining shops. They did not know the root causes of these rejections nor how to reduce their occurrence. They started by examining existing records and constructed a Pareto chart. The following figure presents the chart.

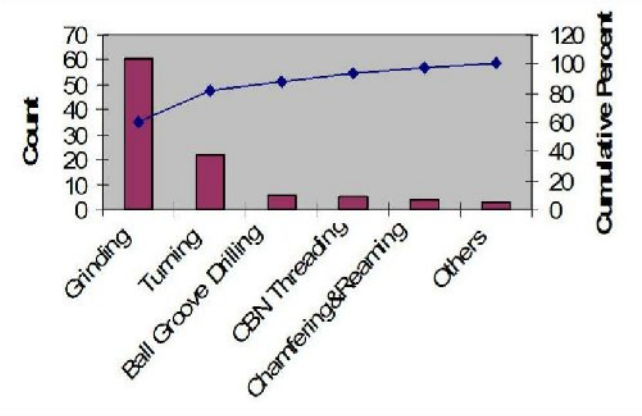


Figure 2.6.Pareto chart of grinding operation problems [Gijo, 2005]

The chart shows that 60% of the rejections were due to grinding problems. Based on the Pareto Chart they started a study improve grinding operations. This study resulted in designed experiments to determine improved grinding operating procedures. The resulting analyses lead to operating procedures that significantly reducing rejections and rework due to grinding operations [Gijo, 2005]