Defect Ratio in TV Production Process: A Case Study Towards Improved Quality

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Abstract
Quality level in TV manufacturing process had been an issue to overcome in recent times. This is because emphasize on quality level at early stage is not established as production output had been the main focus. This study is to expose the defect based on TV models and on final product in order to reduce defects by identifying where the highest waste is occurred. The approach used in this study is direct from the NEXUL system from November 2016 to January 2017 to identify the major defect contribution at TV production process. The implementation of quality tools in the TV production process can bring down the current defect part per million (DPPM) for TV product defects. The data is gathered by extracting from the TV production process server and analyzed using Pareto Chart. The total defect of five TV models had been identified by using quality tools and the highest value is 4196dppm. It has been found that the quality factors and environment play a big role in deciding the causes of the high defect rate.

Keywords: Quality Tool, Defect, Failure Mode, Television

1.0 Introduction

The world today requires organisations to be competitive in terms of quality of the products they offer to satisfy the needs and requirements of the existing and potential customers. The increase of internet usage globally also is one of the key factors for existence of new products and markets competitiveness which leads to the obsolete of existing products (Yannopoulos, 2011). This actually pressure organisations to come up with new products and services that will satisfy customers with their unique criteria. However, in order to deliver a quality service or product, a particular organisation have to ensure that the members in the organisation are committed and dedicated with the ultimate goal of achieving and improving the company's processes by meeting the customer's wants and needs. There are a lot of companies that focuses more on the profit and revenue rather than emphasising on the improvement of the quality tools in the company. By doing the other way around, it eventually will bring a positive upgrade in the business performance and customer satisfaction (Angelova & Zekiri, 2011).

Among many manufacturing companies out there, the television (TV) manufacturing company is one the most sought-after company. This is because TV exists as a channel for many people to be able to connect with the outer world despite the development of information technology (Jensen & Oster, 2009). The manufacturing of a TV requires a lot of efforts as there are a lot of competition in the same business field. If the particular TV

manufacturing company does not give emphasis on the quality of the delivery then they may have to lose business sooner or later. The necessity for a quality improvement is for a greater complexity and precision of a product (Atem & Yella, 2007). Therefore, the aim of this research paper is to identify the current overall defect rate and the major contribution defects in the company's TV production process.

2.0 Methodology

Conceptual framework is constructed in order to generally overview the purpose of the research paper. The framework emphasizes on the quality tools implementation by Plan-Do-Check-Act method and also new quality tools addition which is FMEA into the flow. The result is then monitored by monitoring the process yield, stable process control and also low defect parts per million (DPPM). Briefly, a step by step flow was framed in order to fulfill the research paper's objectives and to realize the conceptual framework which was constructed. This conceptual framework figure 1 be a basis structure to construct the methodology flow for this research paper.

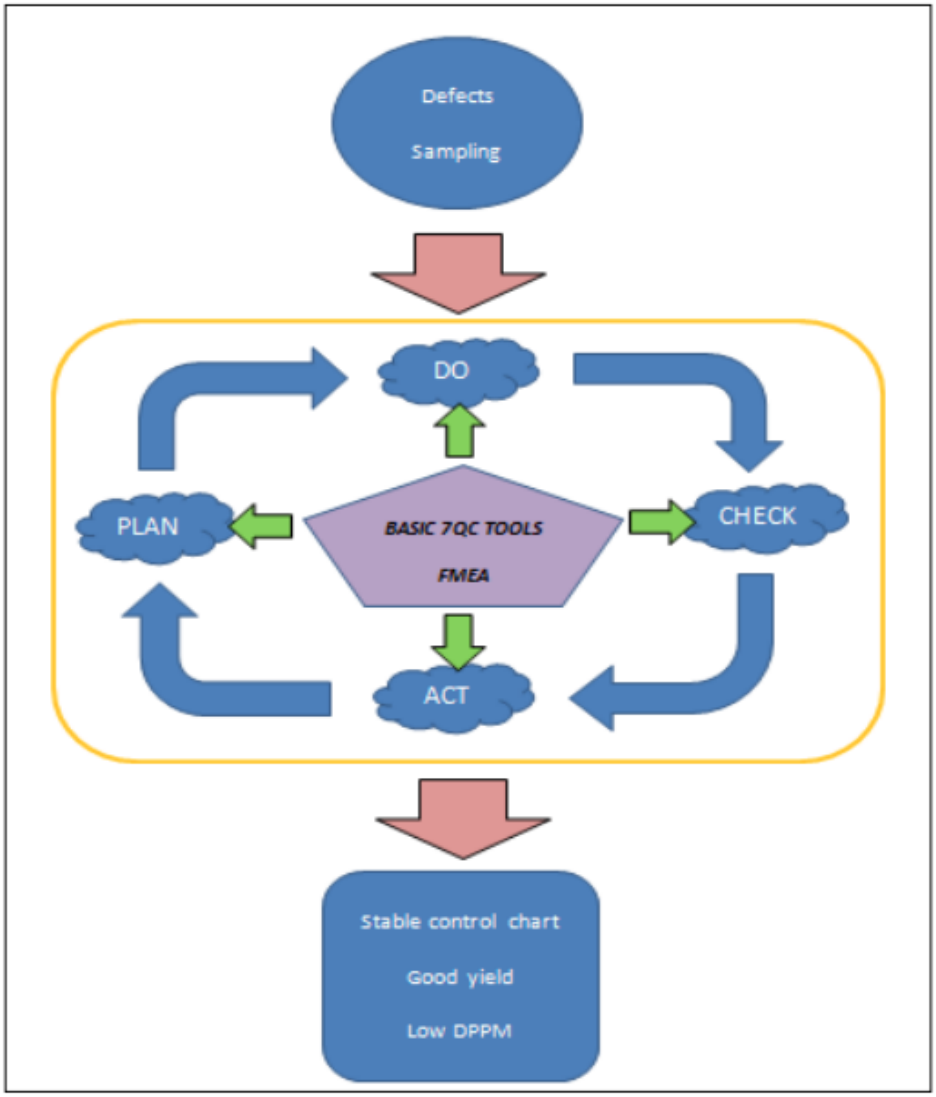

Figure 1: Conceptual framework

2.1 Process Design Study (Current Design)

This study used Pareto charts to identify the most defects generation based on type of TV models, most defects contribution by process and the most defects type generated at the particular process throughout the period. The company taken for this study has more than fifty TV models which are currently on production. Only five models are taken for this study based on the highest quantity produced throughout the period of November 2016 to January 2017. Data were taken from the period of November to January since this period produced the highest quantity for the international market sales based on the high demand. These Pareto charts are act as a fundamental platform to bring down the DPPM level to the targeted value of 1000dppm. Figure 2 illustrate a methodology flow chart on the process flow.

Process identification is the basic steps to start the research. Once done with Pareto charts, a simple check sheet was implemented to stipulate the data collected for the number of specific defects based on the sampling quantity which were gathered for the past 60 days. This data collection acts as before corrective action process condition. Using this check sheet, an attribute control chart is constructed in order to visualize the current process capability and stability in terms of defect distribution with respects to the upper and lower control limit. Once done with the identification which contributes to the high DPPM, cause and effect analysis was established in order to find the cause for the particular product's defects generation in terms of man, method, material, measurement,
environment and machine.

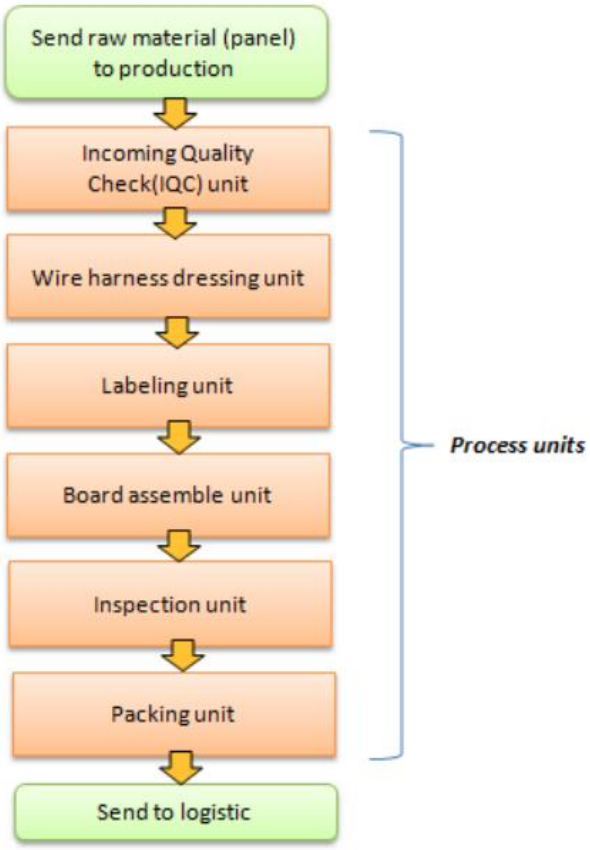

Figure 2: Methodology flowchart

3.0 Result and Finding

This section describes on the data collection for this research paper and also analyze of the data based on the objective of the paper. Therefore, the contribution of quality tools to the improvement of the defect rates of TV product is determined. Finally, the results obtained were analyzed and discussion was carried out on the improvement of the results in future.

3.1 Pareto charts on major defects

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 (Manescu et al., 2015). In order to construct Pareto graph, required data are extracted from the NEXUL system from November 2016 to January 2017 to identify the major defect contribution at TV production process. Total quantity which had been produced throughout this 3-month period for all models is 171,873pcs. Using this data, Pareto charts are constructed to visualize the most defect prone models and narrow down until find the most specific defects contribution.

Table 1 shows the data of defects generated based on five TV models which are extracted from the NEXUL system from the period of November 2016 to January 2017. Based on the current product design, chair improvement can be done by reducing the material, number of parts, combining the two-part become single part and can simplifying assembly operation for projects improvement for future design products to reduce environmental impact for the costly environment.

Table 1: Data of defects based on TV models

	Total defects (pcs)	Total quantity (pcs)	DPPM
43XSV	216	51473	4196
50XSV	150	49080	3056
55XSV	131	46454	2820
40SV2	86	19466	4418
50XSV2	17	5406	3145
Total	600	171879	3491

Figure 3 shows the Pareto graph using the data from Table 1. The graph shows that 43XSV spikes the highest at about 4196dppm. This model was produced at about 51,473pcs for 3 months which also the most produced model currently at this company. So, tackling issues resulting from this TV model would benefit and improve drastically both on quality and profits.

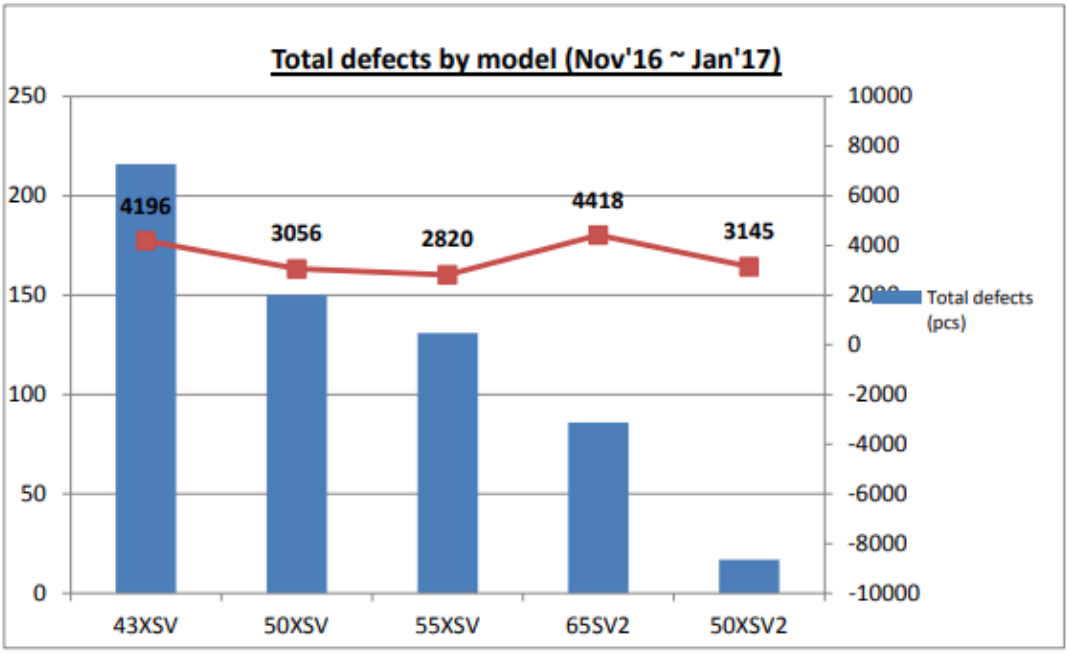

Figure 3: Pareto graph for defects by TV models

4.0 Conclusion

TV model 43XSV is the highest quantity produced plus the highest defect contribution among the other four TV models. Thus, during the quality improvement activity for this study, 43XSV can be taken as the main model to conduct the quality improvement activity and narrow down to top three defects in order to tackle the issues. Besides that, the quality tools implementation in a TV manufacturing company can achieve good process stability and enhance the overall quality level.

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