

CHAPTER 1 INTRODUCTION

1.1 Introduction

Malfunction of machines is one major problem faced in many industries, where inspection on the machines has high cost and it is difficult to perform as this may retard the production process. For this reason, several statistical methods have been employed in industrial management for enhancing the efficiency of the production and reducing defective products, which subsequently decreases the cost. Quality control chart is one method used to control the quality of statistical controlling methodology. However, quality control chart based on simple random sampling (SRS) in quality control may not be satisfied since it gives samples with high variation resulting in wide control limits, thereby low quality control efficiency.

Later, quality control chart has been developed by using a ranked set sampling (RSS). It is believed that this method yields higher efficiency compared with the actual measure under the same sample size because the control limit is narrower leading to better quality control. Ranked set sampling method was proposed by McIntyre (1952) in 1952 developing from simple random sampling in order to solve the problems of high cost from sampling or long performance in actual measure. In 1966, Hall and Dell (1996) found that ranked set sampling has higher efficiency than that of simple random sampling when performs actual measure with the same sampling size. In 2003, Muttalak and Al-Sabah (2003) developed quality control chart for mean of population from comparing the mean numbers that the value fell into the control limit before falling out of average run length (ARL) between perfect ranked set sampling, imperfect ranked set sampling, and simple random sampling methods. In the same year, Ridout (2003) considered two criteria of sample ranking to reduce errors in ranking and to increase the efficiency in sampling. For this study, several criteria of sample ranking were considered to decrease errors in ranking and to increase the sampling efficiency. The results from this study will be used in establishment of bivariate quality control chart which would have higher efficiency in production control.

1.2 Objectives of research

1. To apply ranked set sampling for bivariate quality control chart.
2. To employ the ARL values for investigating the efficiency of the chart.

1.3 Scope of research

1. In this study, we consider only two variables in multivariate control chart.
2. The data used in this study are independent random variables, and has normal distribution with mean μ and standard deviation σ .
3. The data criteria of the process used in this study had normal distribution of μ and standard deviation of σ .

1.4 Expected result

1. The established bivariate control chart based on ranked set sampling will have more efficiency than that of the former control chart.
2. Better ARL values will be obtained from using higher efficient control chart in process controlling.