CHAPTER 5 CONCLUSION AND DISCUSSION

5.1 Conclusion

Generally, there are two groups of statistical process control (SPC), i.e. univariate statistical process control (USPC) and multivariate statistical process control (MSPC) reducing error of decision for selecting samples better than USPC. However, using MSPC is more complex than USPC. RSS is proved to be more efficient when units are difficult and costly to measure, but are easy and cheap to rank with respect to a variable of interest without actual measurement. In this study, we used the RSSMC to develop control charts for mean and Hotelling's control charts. When these control chart are compared with control chart mentioned from above, we find that they have more efficiency and satisfy Muttlak and Al-Sabah's Statistical quality control based on ranked set sampling (2003) resulting similar to our study on comparing control chart for mean. The following are some specific conclusions.

1. Quality control chart using RSSMC dominates the classical charts. If the process starts to get out of control, this chart reduces the number of average run lengths (ARLs) substantially.

2. To overcome the problem of errors in ranking and/or to increase the efficiency of estimating the population mean, we suggest using RSSMC instead of RSS and MRSS. We can see this method will reduce the errors in ranking. The RSSMC dominates all other methods in terms of reducing the ARL if the process starts to get out of control.

Finally, we recommend using the RSSMC to construct both USPC and MSPC, as it reduced the ARL compared to the control chart mentioned from above in case the data have error ranking or unknown some characteristics related to a variable of interest without actual measurement.

5.2 Discussion

5.2.1 Univariate control chart

We compare developed control chart for mean with control chart for mean mentioned from above and then we find that it has more efficient and satisfy Muttlak and Al-Sabah's Statistical quality control based on ranked set sampling (2003) comparing SRS, RSS, MRSS and ERSS. Muttlak and Al-Sabah (2003) said that MRSS and ERSS have more efficiency due to the ARL obtained from MRSS and ERSS, the ARL are less than other methods when the shift on the process mean occur because some data have error ranking.

5.2.2 Multivariate control chart

When developed Hotelling's control chart is compared with Hotelling's control chart based on SRS, we find that newly developed charts are more efficient than the

Hotelling's control chart based on SRS during the shift on the process mean. It satisfies Ian J. Rehmert's Minimax Multivariate Quality Control Chart (1997). To decision of other multivariate control chart are more efficiency, Ian J. Rehmert consider the minimum ARL for comparing the multivariate control chart during the shift on the process mean. In this study, we find that a newly developed chart has less ARL than the Hotelling's control chart when the shift on the process mean occur.

5.3 Suggestion

The results in chapter 4 show that the ARL for RSSMC methods less than the ARL for other methods. However, when the variable used for ranking have related to a variable of interest without actual measurement highly, the ARL obtained from MRSS and RSS are not different to RSSMC.

5.4 Future Work

In the future, the research extends optimized cost and sample unit for ranked set sampling for multiple characteristics.