IMPROVING THE QUALITY OF A SOFT DRINK PRODUCTION PROCESS USING STATISTICAL PROCESS CONTROL

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Statistical process control plays an important role in food processing industries. People, who are engaged in food manufacturing industries, often use quality control methods to improve quality of food. In this research project, statistical process control method was used to analyze the quality of the production process of the soft drink factory of "Ceylon Cold Stores Ltd.", and thus, propose a better statistical quality control procedure to enhance and maintain the quality of the finished products.

For the statistical analysis, the brand name, "Ginger Beer", which has a high demand in the market, was selected and 218 samples (each with sample size 2) were analyzed. For each sample, three quality characteristics: Brix value, CO_2 content, SO_2 content were measured and then, mean values were calculated. A statistical analysis was performed to investigate the quality level of each mean value.

The statistical analysis proved that the manufacturing process has considerable shifts in mean values and hence, cause and effect diagrams were used to identify possible assignable causes for those shifts. The statistical quality control charts, namely "moving-range" charts with between/within subgroup standard deviation were used to monitor and control the process.

Afterward, capability of the soft drink manufacturing process with respect to each quality characteristic was measured using process capability analysis. This analysis revealed that process capability is below the standard for each quality characteristic.

In fact, mean values were highly off-centered and a large number of products found were out of specifications. Mean values of sugar and SO_2 levels of finished products were higher than the nominal levels and mean value of CO_2 level of 1500ml PET bottles was less than the nominal level. Mean value of CO_2 level of 400ml glass bottles was nearly equal to the nominal level. To improve the process capability, necessary process adjustments were proposed.

It was observed that the existing sampling method is inappropriate to monitor the process and thus, the sampling method should be changed. Finally, this process was identified as a process with short production runs and it was suggested that $\bar{x}$ and R charts for deviation from nominal (DNOM) was the best statistical process control method for this food manufacturing process.