ON THE APPLICATION OF STATISTICAL QUALITY CONTROL ON NIGERIA MALT DRINK

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Quality Control is vital in business strategy for many firms because any firm that can delight customers on improved quality can beat its rivals. Statistical quality control technique was applied to Nigeria Malt drink to establish the quality of its product for a fair market competition. A secondary data on sugar level, energy level, etc., were used to establish the product's quality. The *X*-Bar, *R*, and *CUSUM* charts of all the attributes were acceptable.

- Abimibola Victoria Oladugba, Brenda Mbouamba Yankam & **Oluchukwu Chukwuemeka Asogwa** (2022). Prediction variance capability of orthogonal uniform composite designs and orthogonal array composite designs in the spherical region. *Comms in Stats - Theory & Methods*. 54(**16).**
- **O. C. Asogwa,** N. M. Eze, C. M. Eze, C. I. Okonkwo and C. U. Onwuamaeze (2020). On the Modeling of the Effects of COVID-19 Outbreak on the Welfare of Nigerian Citizens, Using Network Model. *American Journal of Applied Mathematics and Statistics.* 8(**2**): 58-63.
- **O. C. Asogwa** and A.V. Oladugba (2015). Of Student Academic Performance Rates Using Artificial Neural Networks (ANNs). *American Journal of Applied Mathematics and Statistics*. 3 (**4**): 151-155.

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- **Problem of the study**

Nowadays customers are faced with all kinds of sub standard finished products especially at the remote parts of Nigeria. This makes one ask if the quality standards of products are still met in the industries? This work checked if the quality standards are still obtainable in Nigerian canned Malta drink by applying Statistical quality control technique on 33cl Canned Malta. The attributes investigated were sugar(g), energy (kJ), protein(g), net-weight(ml) and volume (cl).

- **Literature review**

Akinola (2009) checked the quality of service and methods adopted in service delivery in the Nigerian Banking industry using quality control technique. The result showed that most banks do not use the QC technique to improve their services.

Literature review contr.

Terna et al (2020) applied statistical quality control in sachet water production using p, u, x-bar and R-charts. The results showed that p and u-charts were out of control for production and packaging, but the reverse is the case for x-bar and R-chart.

Yusita et al. (2021) researched on methods in weaving section using statistical process control and came to conclusion that the number of defective items are out of control.

Kevin et al. (2021) carried a research on production process of garment at golden flower in Ungaran, the charts of the product quality control process is not in control.

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Materials and Methods

Data collection

A secondary data were used and were collected from the one of Nigeria brewery. Moreover, it was collected on some nutrients like Sugar (g), Energy (kJ), Protein (g), Net-weight (ml) and Volume (cl) for complete 20days, from Monday to Friday from morning shift to evening shift in the month of August 2021 Methods

Analysis of Data

Descriptive Statistics: these are statistics used to describe quality characteristics and relationships. They include statistics such as

The Mean: This measures the central tendency of a data, denoted by $\bar{X} = {}^{\sum_{x=1}^{n} x_i}/_{n}$ (1)

The Range: This is the simplest and most straight forward measure of dispersion. It is the difference between the maximum and the minimum values in the data set. It is denoted by $R = max_{(x_i)} - min_{(x_i)}$ (2)

The Standard Deviation: This measures the amount of data dispersion or deviation around the mean or average. It is represented mathematically by

$$\hat{\sigma} = \sqrt{{}^{\sum_{x=1}^{n}(x_i-\bar{x})^2}/_{n-1}} \quad (3)$$

Where $\hat{\sigma}$ represents standard deviation of data set and n is the total number of data set.

- X-bar chart
- R- chart
- CUSUM chart

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Results and Discussion

The graph of figures 1- 3 represent the *X*-bar, *R* and *CUSUM* charts for sugar. The data set were analyzed in R software and the plots lie within the boundaries of both upper and lower control limits and this suggests that the standard measurement for sugar contents as well as energy level, protein, net weight and volume as suggested by the producer of Nigeria Malta Guinness drinks is appropriate and correct. The product is under control for Sugar content (g), energy level (kJ), protein content (g), net-weight (ml) and volume (cl), composition as claimed by the company and this means that the appropriate and acceptable products are still being dashed out to the public for consumption.

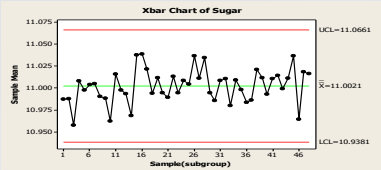

Figure 1: X-bar chart plot for sugar content (g)

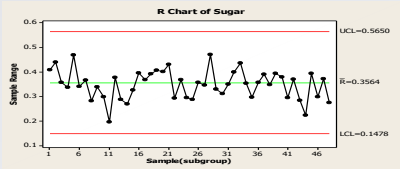

Figure 2: Plot of R-chart for sugar content (g)

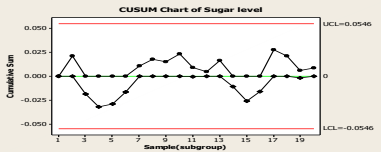

Figure 3: CUSUM chart for sugar content (g)

References

Akinola, G. O. (2009). Quality Control of Services in the Nigerian Banking Industry. *African Research Review,* an International Multi-disciplinary Journal, Ethiopia. 3, 181-203.

- Kevin, N. N. and Amie, K. (2021). Quality Control Analysis on Production Process of Garment at Golden Flower Llc Ungaran. Diponegoro journal of Management 10(2): pp1-15.
- kiwelu A. (2008). *Energy analysis of the production phase in the life cycle of beer. A case study on Nigerian Breweries PLC.* M.Sc. dissertation of Department of Mechanical Engineering, University of Ibadan, Nigeria; pp. 1-12.
- Terna, G. I., Samson, K., Abraham, I. A., and Innocent, B. E. (2020). Application of Statistical Quality Control in Monitoring the Production, Packaging and Marketing Process of Sachet Water. Journal of Scientific Research & Reports 26(9): 32-45,
- See more literature on Yusita et . (2021).

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