Using the Z-Score for Hypothesis Testing

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In the current economic times, consumer caution has increased due to concerns about manufacturers reducing package quantities. Each container has a label quantifying its contents according to the manufacturer. Statistical tests like the z-score can be used to ensure adherence to such claims. The z-score measures deviation from the mean and is employed to standardize and compare values, identify outliers, conduct hypothesis tests, and assess the likelihood of observing specific values or ranges (Beyer, 2021). These tests help maintain transparency and uphold consumer trust. The z-score can determine the accuracy of a company's claim to package 500ml of a beverage by employing hypothesis testing.

A hypothesis formulation is needed to determine whether the company is bottling less beverage capacity than claimed. The z-score formula can then be used to compare the observed mean of the sampled bottles with the claimed value of 500ml. A sample of 30 bottles is done, whose mean and standard deviation are 498.45 and 1.32, respectively. The hypotheses are:

$H_o : x = \mu$

$H_a : x \neq \mu$

The z-score is:

$z = \dfrac{x - \mu}{\dfrac{s}{\sqrt{n}}}$ (Beyer, 2021) where

x is the sample mean

μ is the claimed value (500ml)

s is the sample standard deviation

Therefore,

$$z = \frac{498.45 - 500}{\frac{1.32}{\sqrt{30}}} = -6.4316$$

At the 95% confidence level, the critical z-value is ±1.96 for a significance level of 0.05. As supported by Barroga and Matanguihan, the hypotheses direct the performance of a two-tailed test (2022). The z-value of -6.4316 falls outside the acceptable region of ±1.96. For this reason, the null hypothesis is rejected (Beyer, 2021). This means that the sample mean is significantly different from the claimed 500ml. Indeed, at a significance level of 0.05, there is enough evidence to conclude that the company is bottling less content.

In conclusion, maintaining transparency and ethical practices is crucial for companies as consumers become more cautious. Statistical tests like the z-score provide a reliable method to assess claims and verify customer complaints. From the hypothesis testing, the z-score comparison revealed that the company's packaging claim of 500ml per bottle was false. It highlights the significance of precise packaging and the need for companies to fulfill their commitments to consumers.

References

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