Lab - 2

A manufacturer of a certain brand of 9-volt batteries claims that the average life of the battery is 40 hours when used in a radio, with Standard Deviation of 5 hours. To test the manufacturer's claim, a random sample of 100 batteries was tested and it showed as average life of 38 hours. What can you conclude about the manufacturer's claim at the level of significance α=0.05? Calculate p-value.

SOLUTION

X = Life of 9-V Batteries

Sample Mean = 38hrs

Sample Size = 100

One-Sample Z test

μ mean of Sample

Known standard deviation = 5

Descriptive Statistics

N	Mean	SE Mean	95% CI for μ
100	38.000	0.500	(37.020, 38.980)

Test

Null hypothesis	H_0: $\mu = 40$
Alternative hypothesis	H_1: $\mu \neq 40$

Z-Value	P-Value
- 4.00	0.000

Since p - value = 0.000 << α = 0.05, we strongly reject H0 at 5% level of significance. Since, sample mean is 38 hours and the test is significant, we can conclude that average life of batteries is significantly lower than 40 hrs.

Hence, the manufacturer claim is not valid.

Further, there is a 90% chance that the population mean is between 37.02 hrs. to 38.98 hrs.

Lab – 3

A company wanted to compare the performance of its call center employees in two different centers located in two different parts of the country – Kathmandu, and Pokhara, in terms of the number of tickets resolved in a day. The company randomly selected 30 employees from the call center in Kathmandu and 30 employees from the call center in Pokhara. The following data was collected:

Kathmandu: $\bar{x}_1 = 750$, $\sigma_1 = 20$

Pokhara: $\bar{x}_2 = 780$, $\sigma_2 = 25$

The company wants to determine if the performance of the employees in Kathmandu is different from the performance of the employees in the Pokhara center. Use a two-sample z-test for means.

SOLUTION

X_1 = No. of tickets resolved in Kathmandu

X_2 = No. of tickets resolved in Pokhara

α = Level of Significance = 5% = 0.05

Kathmandu	**Pokhara**
Sample Size (n_1) = 30	Sample Size (n_1) = 30
Sample Mean ($\bar{x}$) = 750	Sample Mean ($\bar{x}$) = 780
Population SD (σ_1) = 20	Population SD (σ_1) = 25

Null and Alternative Hypothesis

Null Hypothesis - $H_0 : \mu_1 = \mu_2$ (There is no significant difference in the mean no of tickets resolved in Kathmandu and Pokhara)

Alternative Hypothesis - $H_1 : \mu_1 \neq \mu_2$ (There is significant difference in the mean no of tickets resolved in Kathmandu and Pokhara)

Two Sample Z Test

The Z value is calculated in Excel using the formula :

= (750-780)/SQRT ((20^2/30) +(25^2/30))

= -5.132395

The P value is calculated in Excel using following formula:

= 2*NORM.S. DIST (-5.132395, TRUE)

= 2.86081E-07

Conclusion

Since, p - value = 2.86081E-07 << α – value = 0.05, we strongly reject H_0 in favor of alternative hypothesis H_1 at 5% level of significance. Hence, there is a significant difference in the mean no. of tickets resolved per day in two locations i.e. Kathmandu and Pokhara. Since sample mean of Pokhara = 780 is higher than that of Kathmandu = 750 and the test is significant, we can say performance of Pokhara is significantly higher than Kathmandu in resolving the tickets raised by the customers.