

Quantitative Methods

Q1

As per the given scenario, the marketing analyst wants to apply the interval estimation formula for proportions to determine the confidence interval for the proportion of customers interested in a new service

Where the sample size of the customers is $n = 250$

Customers interested in subscribing $x = 162$

Therefore, $\hat{p} = 162/250$

$$\hat{p} = 0.648$$

We want a 90% confidence interval for the true population proportion

$$\begin{aligned}\text{Formula} &= \hat{p} \pm z \sqrt{\hat{p}(1-\hat{p})/n} \\ &= 0.648 \pm 1.65 \sqrt{0.648(1 - 0.648) / 250} \\ &= 0.648 \pm 1.65 \sqrt{0.648(0.352) / 250} \\ &= 0.648 \pm 1.65 \sqrt{0.228096 / 250} \\ &= 0.648 \pm 1.65 \sqrt{0.0009123} \\ &= 0.648 \pm 0.0497\end{aligned}$$

$$\text{Upper limit} = 0.648 + 0.0497 = 0.6977 = 69.77\% \text{ and Lower limit} = 0.5983 = 59.83\%$$

Thus, the 90% confidence interval is roughly 59.8% to 69.8%. This indicates that, if the sample is representative, the business can make strategic decisions based on the 90% confidence level that roughly 60–70% of all customers would be interested in subscribing. A larger sample size could be used to lower the margin of error if greater precision is required.

Q2. A

The Bayes theorem is also known as the revised probability theorem or Bayes law. The Presbyterian priest Thomas Bayes has created the Bayes theorem. Bayes' theorem determines the probability that a given effect was caused by a specific cause by revising the probability based on updated information.

By combining historical data with recent experiences, the Bayes Theorem will assist the firm in reevaluating the likelihood that a highly satisfied client was served by which advisor in the aforementioned scenario.

The financial advisory firm uses the Bayes theorem to update the probability of the clients served by each advisor, and it keeps track of client satisfaction rates.

Since we are gathering the data from the clients the information is more accurate, and the feedback is more sincere. In order to determine the result, the data should be gathered from a variety of clients. The company must apply the Bayes Theorem consistently throughout the organisation and update it whenever new feedback is received.

There should be other methods for evaluating performance besides the Bayes theorem. For a thorough evaluation, the company should integrate the updated probability with additional metrics like complaint rates, revenue growth, and client retention.

Employ sufficient and reliable satisfaction data, take into account outside influences, make sure that the application is equitable and consistent, teach employees how to properly understand the findings, and integrate these insights with other performance metrics.

The advising business can benefit from applying the Bayes Theorem since it helps transform customer input into insights that improve performance and firm evaluation.

Q2. B

As given that some departments use Excel's NORM.DIST and NORM.INV functions for normal distribution calculations and others rely on the conventional z-table. A large financial institution wishes to standardise its risk analysis practices throughout the organisation.

1. Excel's NORM.DIST and NORM.INV methods can be used to standardise probability across departments because it's a large financial institution. This will not only speed up calculations but also lower the possibility of human error because a fixed formula is used, whereas traditional Z-tables increase the probability of error.
2. Whereas NORM.INV provides the probability and the value needs to be calculated, Excel's NORM.DIST is helpful if the probability needs to be determined and the value of X is known.
3. Z-tables are excellent for learning and improving knowledge, but Excel is the best tool for real-world applications.
4. Large institutions with multiple data sources can benefit greatly from the quick, accurate, and consistent results that Excel NORM.DIST and NORM.INV produces. In contrast, Z tables require a manual process that works well for small businesses but not for large institutions.
5. Because everyone uses the same functions, Excel NORM.DIST and NORM.INV not only guarantees consistency but also increases efficiency by minimising human error and facilitating quick calculations.

The financial institution should switch to using Excel NORM.DIST and NORM.INV throughout the institute to standardise its risk analysis processes across departments and to preserve accuracy, consistency, and ease of training new analysts.