ALEN ACADEMY

0921576456



ALEN ACADEMY

MANAGEMENT STUDENT

Course *Statics management I and Statics for management II* General focus on Exit Exam

Prepared by :- Samuel Asefa

Email *dadsamuel19@gmail.com*

Learning Outcome

- ✓ **Basic concept of statics**
- ✓ **Apply statistical tools in managerial decision making**
- ✓ **Apply various statistical tools for decision making**
- ✓ **Make valid inference from data**
- ✓ **Construct and test different types of hypothesis**
- ✓ **Find correlation between variable**
- ✓ **Apply statistical test in the preparation of Research report**

Basic concept of statics

What is Statics

Statics is a branch of physics that deals with the study of objects at rest or in a state of equilibrium. It involves analyzing the forces and factors that affect the stability of an object or system, and how these forces interact to maintain the object's position and balance. In the context of management, statics refers to the study of the forces and factors that influence an organization's stability and equilibrium, and how management can make informed decisions to maintain this stability.

❖ Basic concept of statics

The basic concept of statics is the understanding of how forces and factors interact to keep an object or system in a state of equilibrium. This involves analyzing the forces acting on an object, such as tension, compression, and shear forces, and how these forces balance each other out to keep the object stable. Statics also considers the effects of factors such as friction, gravity, and inertia on the stability of an object.

In the context of management, the basic concept of statics involves understanding the various forces and factors that influence an organization's stability, such as market forces, competition, internal dynamics, and external influences. By analyzing these forces and factors, management can make informed decisions to maintain the organization's equilibrium and stability.

Overall, the basic concept of statics involves the analysis of forces and factors to understand how they interact to maintain stability and equilibrium in both physical objects and organizational systems.

❖ Apply statistical tools in managerial decision making

1. Descriptive Statistics: Managers can use descriptive statistics such as mean, median, mode, standard deviation, and range to summarize and describe the key characteristics of a dataset. This can help them

understand the current state of their business and identify areas for improvement.

2. Regression Analysis: Regression analysis can be used to identify relationships between different variables in a business setting. For example, managers can use regression analysis to understand how changes in one variable (such as marketing spending) affect another variable (such as sales revenue).

3. Hypothesis Testing: Managers can use hypothesis testing to make decisions based on statistical evidence. For example, they can test hypotheses about the effectiveness of a new marketing campaign or the impact of a new product feature on customer satisfaction.

4. Forecasting: Managers can use statistical forecasting techniques to predict future trends and make informed decisions about resource allocation, inventory management, and production planning.

5. Quality Control: Statistical process control techniques can help managers monitor and improve the quality of products and services by identifying and addressing variations in production processes.

6. Decision Trees: Managers can use decision trees to analyze complex decision-making scenarios and identify the best course of action based on statistical probabilities.

7. Data Visualization: Managers can use statistical tools to create visual representations of data, such as charts and graphs, to help them better understand and communicate key insights to stakeholders.

By applying these statistical tools, managers can make more informed decisions, improve operational efficiency, and drive business growth.

❖ Apply various statistical tools for decision making

There are several statistical tools that can be applied for decision making. Here are a few examples:

1. Descriptive Statistics: Descriptive statistics summarize and describe the main features of a dataset. They provide measures such as mean, median, mode, standard deviation, and range, which can help in understanding the distribution and characteristics of the data.

2. Inferential Statistics: Inferential statistics are used to make inferences or predictions about a population based on a sample. Techniques such as hypothesis testing and confidence intervals can help in making decisions by determining if there are significant differences or relationships between variables.

3. Regression Analysis: Regression analysis is used to model the relationship between a dependent variable and one or more independent variables. It can be used to make predictions or decisions based on the relationship between variables.

4. Time Series Analysis: Time series analysis is used to analyze and predict patterns in time-dependent data. It can be useful for forecasting future trends or making decisions based on historical patterns.

5. Decision Trees: Decision trees are a graphical representation of decision-making processes. They use statistical techniques to determine the optimal path to take based on different variables and outcomes.

6. Monte Carlo Simulation: Monte Carlo simulation involves running multiple simulations using random sampling to model different possible outcomes. It can be used to assess risk and uncertainty in decision-making processes.

7. Data Visualization: Data visualization tools, such as charts, graphs, and dashboards, can help in visually representing data and identifying patterns or trends. They can aid in decision-making by providing a clear and concise overview of the data.

These are just a few examples of statistical tools that can be applied for decision making. The choice of tool depends on the specific problem, data available, and the desired outcome.

❖ Make valid inference from data

In order to make valid inferences from data, it is important to follow proper statistical procedures. Here are some steps to ensure valid inference:

1. Clearly define the population: Determine the population of interest for your study or analysis. This will help in making accurate inferences about the entire population based on the sample data.

2. Random sampling: Use random sampling techniques to select a representative sample from the population. This helps to minimize bias and ensure that the sample is a good representation of the population.

3. Statistical tests: Apply appropriate statistical tests to analyze the data. This could include hypothesis testing, t-tests, chi-square tests, regression analysis, etc. These tests help in drawing conclusions and making valid inferences about the population based on the sample data.

4. Confidence intervals: Calculate confidence intervals to estimate the range within which the true population parameter is likely to fall. This

provides a measure of uncertainty and helps in making valid inferences about the population.

5. Statistical significance: Assess the statistical significance of the results. This involves determining whether the observed differences or relationships between variables are statistically significant or if they occurred by chance. Statistical significance helps in making valid inferences about the population.

6. Consider limitations: Be aware of any limitations or assumptions in the data or statistical methods used. Recognize potential sources of bias or confounding factors that could affect the validity of the inferences.

By following these steps and using appropriate statistical tools, one can make valid inferences from data and make informed decisions based on the results.

❖ Construct and test different types of hypothesis

To construct and test different types of hypotheses, you can follow these steps:

1. Clearly define the null and alternative hypotheses: The null hypothesis (H0) represents the default or no effect assumption, while the alternative hypothesis (Ha) represents the opposite or what you are trying to prove. Make sure both hypotheses are mutually exclusive and collectively exhaustive.

2. Determine the appropriate statistical test: The choice of statistical test depends on the nature of your data and the type of hypothesis you are testing. For example, if you are comparing means between two groups, a t-test may be appropriate. If you are testing for association between categorical variables, a chi-square test may be suitable.

3. Set the significance level: Determine the desired level of significance (usually denoted as α) before conducting the test. Commonly used values are 0.05 or 0.01, representing a 5% or 1% chance of rejecting the null hypothesis when it is true, respectively.

4. Collect and analyze the data: Gather relevant data and perform the appropriate statistical analysis based on your chosen test. Calculate the test statistic and p-value, which indicates the probability of obtaining the observed data under the null hypothesis.

5. Compare the p-value to the significance level: If the p-value is less than or equal to the significance level, reject the null hypothesis in favor of the alternative hypothesis. Otherwise, fail to reject the null hypothesis.

6. Interpret the results: Based on your conclusion, make inferences about the population and draw appropriate conclusions. Consider any limitations or assumptions in your analysis and discuss the implications of your findings.

Remember that hypothesis testing is a probabilistic approach, and your conclusions are based on the evidence provided by the data. It is important to understand that failing to reject the null hypothesis does not necessarily mean that the null hypothesis is true; it simply means that there is not enough evidence to support the alternative hypothesis.

❖ Find correlation between variable

To find the correlation between variables, you can follow these steps:

1. Identify the variables of interest: Determine which variables you want to analyze and find the correlation between. These variables should be quantitative or numerical in nature.

2. Collect the data: Gather the data for the variables you are interested in. Make sure you have sufficient data points for each variable.

3. Calculate the correlation coefficient: Use a statistical method, such as Pearson's correlation coefficient, to calculate the correlation between the variables. This coefficient measures the strength and direction of the linear relationship between the variables.

4. Interpret the correlation coefficient: The correlation coefficient ranges from -1 to 1. A value of -1 indicates a perfect negative correlation, 0 indicates no correlation, and 1 indicates a perfect positive correlation. The closer the value is to -1 or 1, the stronger the correlation. The sign of the coefficient indicates the direction of the relationship (positive or negative).

5. Assess the significance of the correlation: Determine if the correlation coefficient is statistically significant. This can be done by calculating a p-value associated with the correlation coefficient. If the p-value is less than your chosen significance level (e.g., 0.05), you can conclude that there is a significant correlation between the variables.

6. Consider other factors: Keep in mind that correlation does not imply causation. Even if a significant correlation is found, it does not necessarily mean that one variable causes the other. Consider other factors and potential confounding variables that could influence the relationship.

7. Visualize the relationship: Create a scatter plot or other visualizations to better understand the relationship between the variables. This can help identify any patterns or outliers.

Remember that correlation measures the strength and direction of a linear relationship between variables, but it does not provide information about causality or other types of relationships (e.g., nonlinear).

❖ Apply statistical test in the preparation of Research report

When preparing a research report, statistical tests are often used to analyze data and draw meaningful conclusions. The choice of statistical test depends on the research question, study design, and type of data collected. Here is an example of how a statistical test can be applied in a research report:

Research Question: Does adjusting staffing levels significantly impact capacity utilization?

Study Design: A short-range planning intervention is implemented where staffing levels are adjusted. Capacity utilization data is collected before and after the intervention.

Hypothesis: The null hypothesis (H0) states that there is no significant difference in capacity utilization before and after adjusting staffing levels. The alternative hypothesis (Ha) states that there is a significant difference in capacity utilization before and after adjusting staffing levels.

Statistical Test: Paired t-test

Explanation: A paired t-test is appropriate when comparing two related samples, such as before and after measurements in the same group. In this case, the capacity utilization data before and after adjusting staffing levels can be considered paired samples from the same group (e.g., the same organization).

Procedure:

1. Calculate the difference in capacity utilization between before and after measurements for each observation.

2. Calculate the mean and standard deviation of the differences.

3. Perform a paired t-test using the mean difference and standard deviation of the differences.

4. Determine the p-va

5. Compare the p-val to determine statistic

6. If the p-value is les and conclude that adj utilization. If the p-va fail to reject the null

GOOD LUCK

" እርሱ ራሱ ተፈትኖ መከራን ስለ ተቀበለ የሚፈተኑትን ሊረዳቸው ይችላልና።

"

(ወደ ዕብራውያን 2:18

Reporting: In the research report, include a section describing the statistical analysis conducted to test the hypothesis. Present the results of the paired t-test, including the t-statistic, degrees of freedom, p-value, and conclusion regarding the null hypothesis. Additionally, provide any relevant effect size measures or confidence intervals to further interpret the results.

Note: It is important to consult with a statistician or use statistical software to ensure the appropriate statistical test is chosen and implemented correctly.

Email dadsamuel19@gmail.com

Telegram https://t.me/AlenAcademy

Call 0921576456