

Week-02-L-03

# Agricultural Statistics in Practice

## Forecasting Techniques in Agriculture

## Forecasting Methods

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# Forecasting Methods

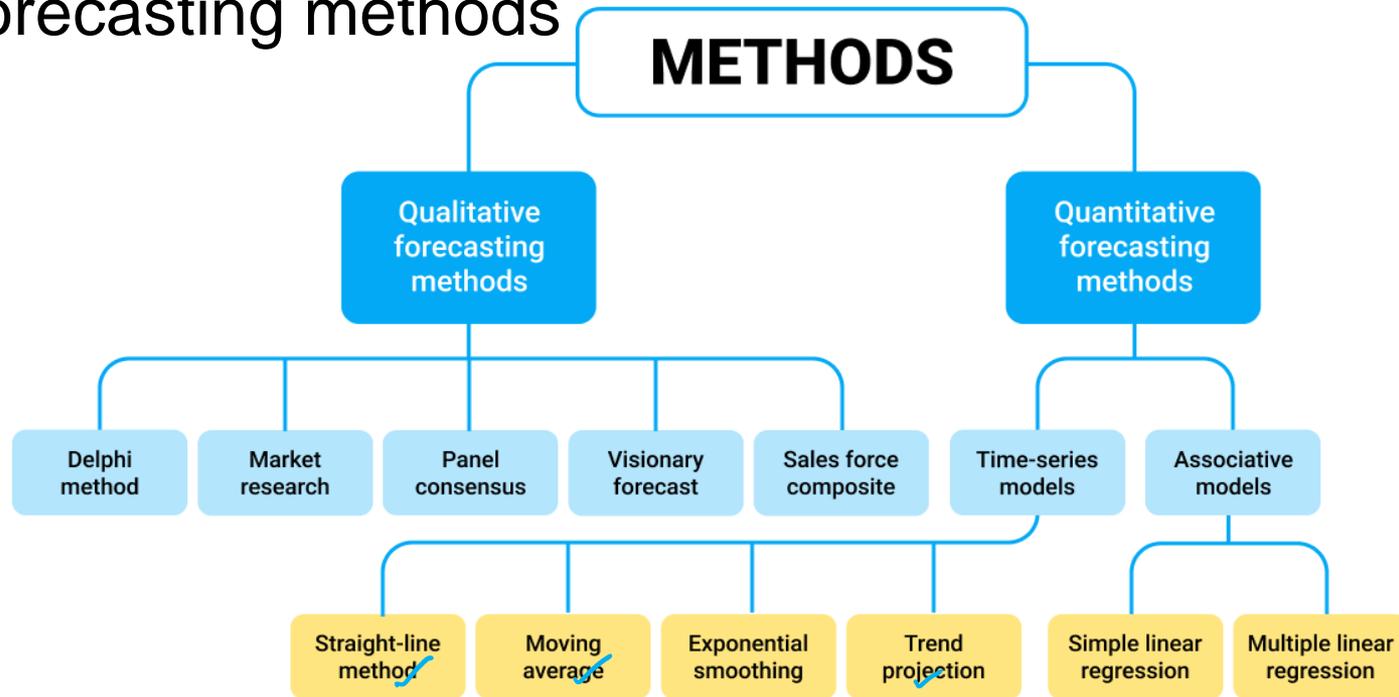
- Forecasting models help businesses predict sales, supply, demand, and consumer behavior.
- They provide valuable insights for sales and marketing decisions.
- Different methods offer varying levels of information and accuracy.
- Visual representations of expected outcomes make forecasting models appealing.
- Businesses can make informed decisions based on projected future scenarios.





# Forecasting Methods

- 2 Prime methods of forecasting are:
  1. Quantitative forecasting methods
  2. Qualitative forecasting methods





# Methods

<i>Quantitative forecasting methods</i>	<i>Qualitative forecasting methods</i>
<ol style="list-style-type: none"><li>1. Algebra ✓</li><li>2. Permutations and combinations</li><li>3. Set theory</li><li>4. Matrix algebra</li><li>5. Integration</li></ol>	<ol style="list-style-type: none"><li>1. Standard deviation</li><li>2. One-factor &amp; Multi-factor analysis of variance</li><li>3. Multi-factor analysis of variance</li><li>4. Two-sample t-test for equal means</li><li>5. Autocorrelation</li></ol>

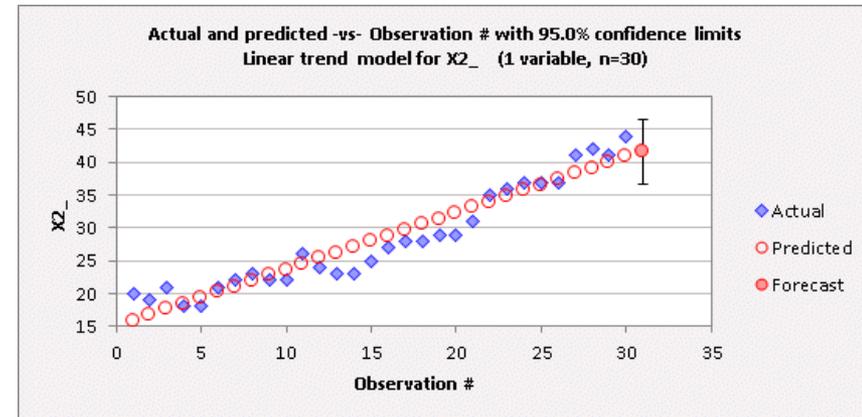
# Quantitative Methods –

## 1. Time-series forecasting methods

- Time-series forecasting model utilizes historical data to predict future company behavior, such as consumer behavior and sales trends.
- It analyzes data in hours, weeks, months, and years to project future values. By employing mathematical formulas, various time-series models can generate accurate forecasts for the future.

### A. Straight – Line Method

1. Uses past data and trends to estimate future revenues.
2. By determining the growth rate of sales, businesses can make accurate forecasts for future years.
3. Provides insights into ongoing growth and financial decision-making.



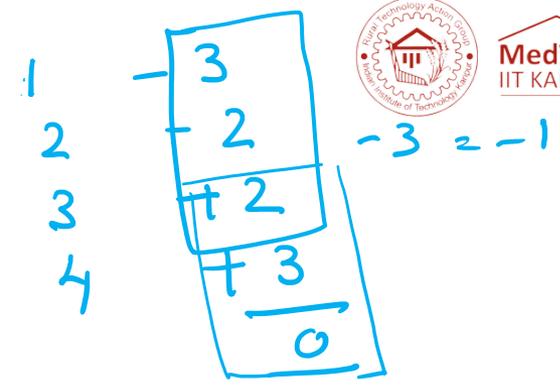


# Quantitative Methods –

## 1. Time-series forecasting methods

### B. Moving average model

1. The moving average model is used for short-term trend forecasting, typically on daily, monthly, quarterly, or half-yearly intervals.
2. It is commonly used to forecast sales, revenue, profit, or other key business metrics.
3. The model calculates future outcomes by analyzing past and current revenues and taking the average within a specific time period.
4. This forecasting model is valuable for evaluating the performance of a metric within a defined timeframe.





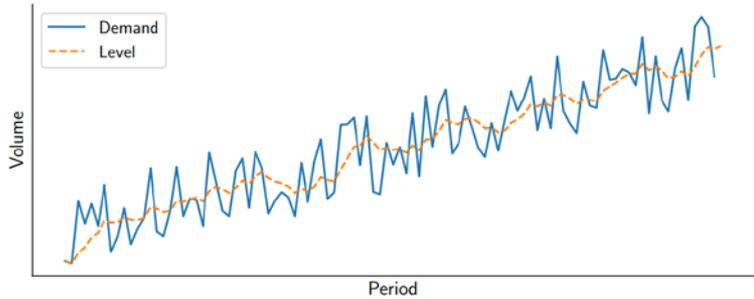
# Quantitative Methods –

## 1. Time-series forecasting methods

### C. Exponential smoothing model

1. The exponential smoothing model is a time-series forecasting method that uses weighted averages based on past observations.
2. It predicts future values by giving more weight to recent observations and gradually decreasing the weight for older observations.
3. The model utilizes past company data and calculates forecasts by incorporating the past forecast and the percentage of value.
4. Recent values in the series are considered more important, while older values have exponentially diminishing influence.

90% B     mate  
 80% 2     Feb  
 20% 1     Jan

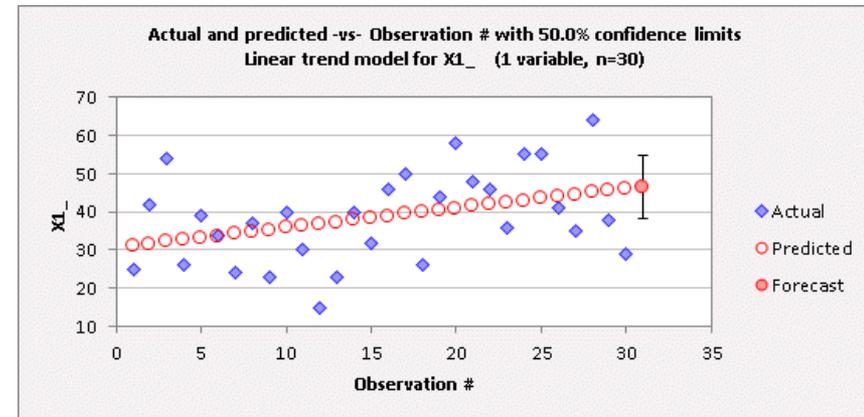


# Quantitative Methods –

## 1. Time-series forecasting methods

### D. Trend projection model

1. The trend projection model utilizes past behavior to forecast future trends by identifying recurring patterns.
2. It assumes that factors contributing to past trends will continue in the future.
3. The model requires reliable and long-term time-series data arranged chronologically for evaluation.
4. By identifying trends, businesses can gain insight into future demand and make predictions.
5. The trend projection model is effective when the influence of variables can be determined based on past behavior.



# Quantitative Methods –

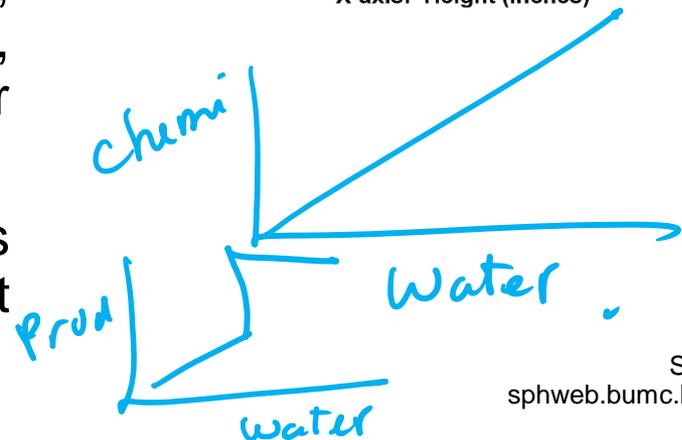
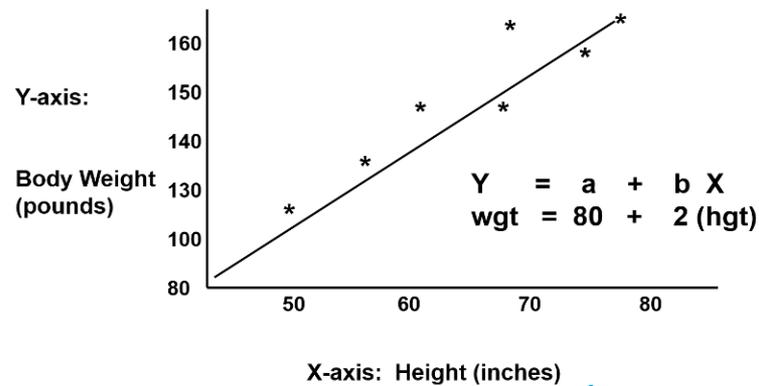
## 2. Causal/Associative forecasting methods

- Build a relationship between the variable being forecasted and other variables.
- Projections are based on this association. Causal models include simple linear regression and multiple linear regression as examples.

### A. Simple linear regression model

- Model that examines correlation between two variables: the dependent variable (e.g., sales) and the independent variable (e.g., profit). It provides a detailed context for your forecast.
- On a graph, the independent variable is plotted on the X-axis and the dependent variable on the Y-axis.

Line  
$$y = mx + c$$



# Quantitative Methods –

## 2. Causal/Associative forecasting methods

### B. Multiple Linear Regression Model

1. Explores relationships between multiple independent variables and a dependent variable.
2. Assumes same approach as simple linear regression but with multiple variables.
3. Provides clearer picture and accurate forecasts when multiple factors affect business performance.
4. For example, it can predict daily cigarette consumption based on variables like smoking duration, starting age, and type of smoker.
5. Complex to perform manually, statistical software is recommended for multiple regression.



health of soil  
mineral/  
chen  
Water  
yield

Thank You

