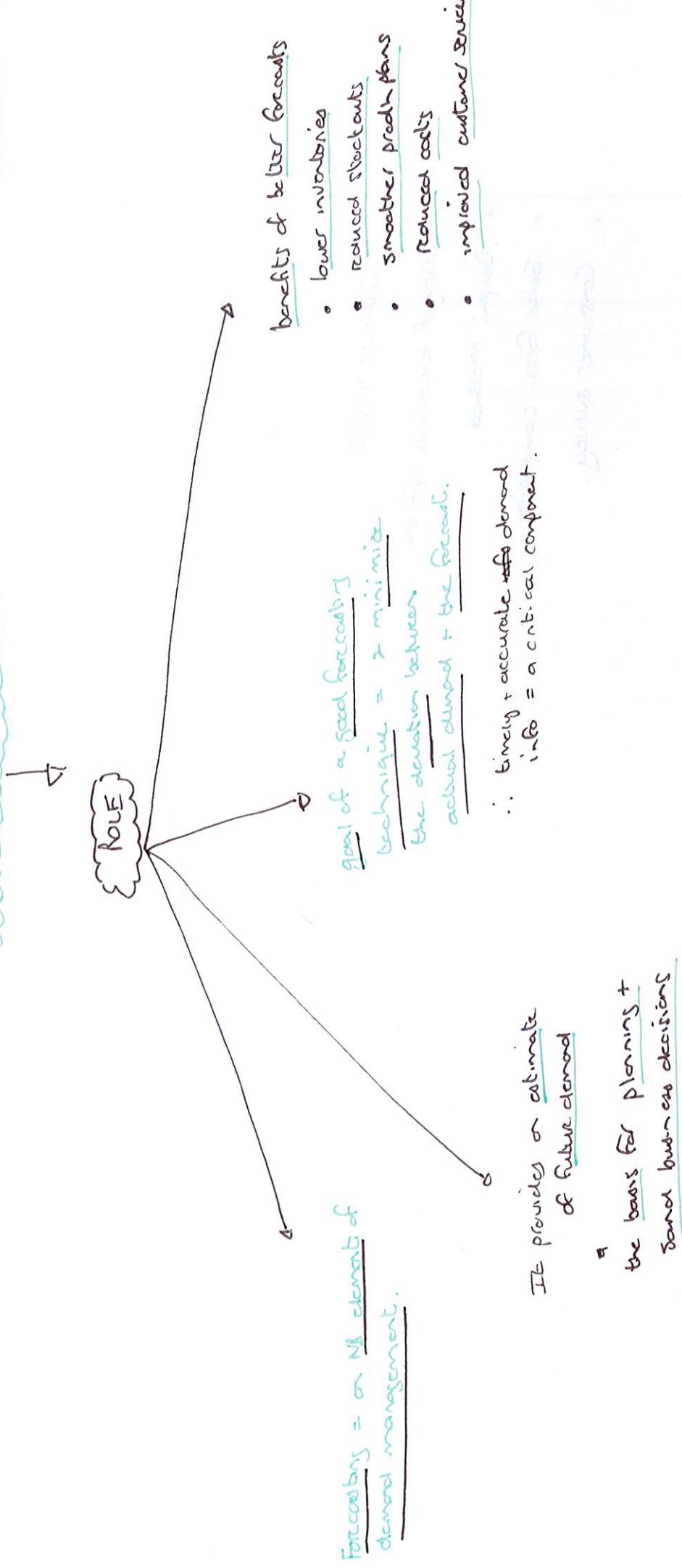


## DEMAND FORECASTING

①

[SU 2.]



# Forecasting Techniques

## FORECASTING TECHNIQUES.

### QUALITATIVE

- Jury of executive opinion
- Delphi method
- Sales force composite
- Consumer survey.

### QUANTITATIVE

- Time series forecasting models
  - \* Naïve forecast.
  - \* Single moving average forecasting model
  - \* Weighted moving average forecasting model
  - \* Exponential smoothing forecasting model
  - \* Trend-adjusted exponential smoothing model
- Linear trend forecasting model
- Associative forecasting models
  - \* Curve-and-Effect Models -  
\* Non-Linear Regression
  - \* Multiple regression.

## Forecasting Techniques

→ Use mathematical models + relevant historical data to generate forecasts.

### Quantitative Techniques

#### Time-Series Forecasting

#### Components of time series

##### ① Trend Variation

Trend represent either increasing/decreasing movement over many years

- are due to factors such as
  - population growth
  - population shifts
  - cultural changes
  - income shifts

Common trend lines are linear, S-curves, exponential or asymptotic.

##### ② Cyclical Variation

Cyclical variations are periodic movements that are longer than a year. e.g. influenced by macroeconomic and political factors.

Example:

The business cycle  
(depression or expansion)

##### ③ Seasonal Variation

Seasonal variations shows periodic & regular though repeat over a consistent interval such as:

- hours
- days
- weeks
- months
- years

##### ④ Random Variations

Random variations are due to unexpected / unpredictable events such as:

- disasters (humane)
- strikes
- wars.

Due to seasonality many companies do well during certain months and not so well in other months.

Based on opinion + intuition

Forecasting Techniques

Sn 2

Q.

### Qualitative Techniques

#### ① Jury of executive opinion

- A group of senior management executives who are knowledgeable about the market, their competitors and the business environment collectively develop the forecast.

- Technique = applicable for long-range planning + new product introductions.

#### ② Sales Force Composite

- Represents a good source of market info
- Seeks input from sales force
- Forecast = generated based on the sales force knowledge of the market + customer needs

#### ③ Consumer Survey

- A questionnaire = developed that seeks input from customers on NB issues such as

- Future buying habits
- new product ideas
- opinions about existing products.

#### ④ Delphi Method

- A group of internal + external experts are surveyed during several rounds

- (150) Future costs + long-term forecasts of demand.

- The process can be time consuming + expensive.

- This approach = applicable to high-risk technology forecasting / large, expensive projects or major new product introductions.

- Group members do not physically meet

- The answers from the experts are accumulated after each round of the survey + summarized

- Summary of responses = sent out to experts in the next round. (Note individual experts can modify their responses)

- The process continues until consensus is reached.

# FORECASTING TECHNIQUES

## QUANTITATIVE FORECASTING TECHNIQUES

### Time Series Forecasting Models.

(a) Naïve forecast. Assumption is that demand for the next period is = to the actual demand for the immediate period.

$$F_{t+1} = A_t$$

The estimate for the next period is = to the actual demand for the immediate period.

(b) Simple Moving Average Forecast

Uses historical data to generate a forecast & works well when demand = fairly stable over time.

$$F_{t+1} = \frac{\sum_{i=t-n+1}^t A_i}{n}$$

An n-period weighted moving average forecast = the weighted average of the n-period observations using equal weights. The only restriction = that the weights should be nonnegative and sum to one.

(c) Weighted Moving Average Forecast.

- Method = involves 2 steps  
- develop, understand, store data & operate  
- advantage = simple & user friendly, understand, store data & operate  
- weakness = do not reflect generally & trend changes

(d) Exponential Smoothing Forecast

- Method = simple & user friendly & requires minimal data  
- most widely used forecasting technique.

$$F_{t+1} = F_t + \alpha (A_t - F_t)$$

$$\hat{Y} = b_0 + b_1 x$$

A linear trend forecast can be estimated using simple linear regression to fit a line to a series of data occurring over time.

# FORECASTING TECHNIQUES

## QUANTITATIVE FORECASTING TECHNIQUES

七

cause & effect models:  
→ assumes that 1 or more independent variables are related to dependent variable.  
↳ In model 3 predict stature dependent

Young Jars and 1973 [indicates cause-and-effect models have been developed and used as a cause (independent variable) variable to some extent]

(a) Simple Linear Regression  
Variable, we have a simple regression forecast equivalent

When there = only I explanatory variable, we have a simple regression forecast equivalent to the linear trend forecast

The difference = that there I explanatory variable  $y = b_0 + b_1 x$

x variable is no longer time = explanatory variable instead of dependent variable

(b) Multiple Regression Forecast

When several explanatory variables are used to predict the dependent variable, a multiple regression forecast = applicable.

$$y = b_0 + b_1 x_1 + b_2 x_2 + \dots + \cancel{b_n x_n}$$

# COLLABORATIVE FORECASTING, PLANNING, AND REVENUE MANAGEMENT

## COPR MODELS

↳ key activities:

### ① Strategy + Planning

- Establish the ground rules for  
the collaborative relationship

- determining product mix & placement  
a. duration of contract along the time period

### ② Demand + Supply Management

Forecast:

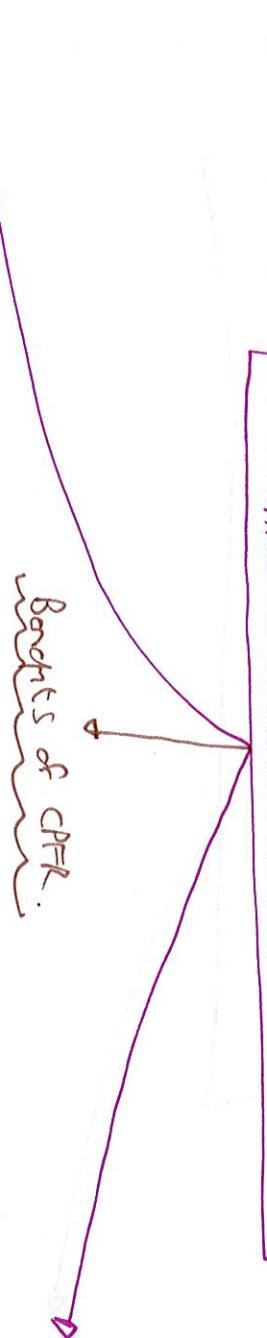
- the consumer demand for the retailer (point of sale)
- occur and simulate requirements for the manufacturer over the planning horizon
- Place orders
- prepare + deliver
- Distributors
- receive + stock products on retailer stores
- record sales by households
- make payments

### ③ Execution

### ④ Analysis

- monitor planning + execution activity for exception conditions
- assess the results + calculate key performance metrics
- Share insights + adjust plans for continuously improved results.

## COLLABORATIVE PLANNING, FORECASTING, AND REPLENISHMENT (CPFR)



### Definition

= a set of business processes that exists in a Supply Chain that are used for collaboration on a number of retailer / manufacturer functions towards overall efficiency in a supply chain.

### Benefits of CPFR

- Strengthens partner relationships
- Allows collaboration on future requirements & plans.
- Uses joint planning & promotions management.
- Integrates planning, forecasting and logistics activities.
- Manages the demand chain & proactively eliminates problems before they appear.

### Collaboration Tasks /

- Task 1: Collaborative arrangement  
Task 2: Joint Business Plan  
Task 3: Sales Forecasting  
Task 4: Order Planning / Forecasting  
Task 5: Order Generation  
Task 6: Order Fulfillment  
Task 7: Exception Management  
Task 8: Performance Assessment

## Collaborating Planning, Forecasting and Deployment

### CAFE Performance Improvement steps:

- ① Scale long-term, holistic solutions not quick / myopic fixes.
- ② Reconcile conflicting goals & mechanics
- ③ Pursue inclusive problem solving  
do not depend on "experts" who don't have accountability for the business
- ④ Establish collaborative processes that encourage idea creation, shared problem solving & high adoption rates  
across organizational boundaries
- ⑤ Use a disciplined and iterative set of methodologies such as CAFE, Score or Six Sigma to help define issues, root causes & solutions
- ⑥ Develop a culture of continuous improvement, decreasing at the customer-facing level  
but over time greater emphasis on most likely & know what's needed
- ⑦ Create clear accountabilities + assign authority with a focus on core business processes  
rather than on functional organizational silos or loyalists.
- ⑧ Commit to technology investment for execution, communication, execution management and root-cause analysis
- ⑨ Reduce decision cycle times
- ⑩ Implement rapidly

## CALCULATIONS, PLANNING, FORECASTING AND REPLACEMENT.

c

### Challenges facing CPFR implementation.

d.

Difficulty of making internal

changes, cost and time

↓

Company need to educate  
their employees on the benefits  
of the process changes

+

Company are at a competitive  
disadvantage because no company  
implement CPFR

↓

the type of proprietary info  
required by CPFR.

The disadvantages of  
maintaining the status quo