

Operation Management.

⇒ Introduction

2) Process Analysis

3) Productivity

4) Quality → Meeting requirements.

* Operation Management

→

(1) Cost Efficiency (2) Quality

(3) Responsiveness (Time) (4) Variety ^{choice}

Inventory & flow time, rate.

flow time → processing time.

↳ Capacity

Inventory → Pending cases.

Bottleneck ⇒ process → lowest capacity.

OPERATION ANALYTICS

- Network management
- Resource location
- Capacity planning
- Descriptive analysis
- Predictive & prescriptive analysis
- Alternative = Select best course of action

Operation

→ Uncertain situations

① Matching Demand with supply
→ Describe uncertainty for better decisions.

→ Forecasting ⇒ Strant
seasonal variations

Descriptive Analysis

① Predictive
Analysis

② Prescriptive
Analysis

→ Course of action

→ Forecasting with past historical data -

I] News Vendor Prob, RM.

→ Moving avgs, Exponential Smoothing

→ New products forecasting

→ Fitting Demand & Supply distributions.

How much to produce Estimate

⇒ Cost/price of the product

→ Some data on demand

Demand \approx 100, sell all 100

$$(12-3) * 10 = 90$$

~~29 2 41~~

~~50~~ → 27

~~70~~ 65 ~~60~~

Point
forecast X

Demand ⇒ Random variable

Model future ⇒ Probability Dist.

Describe uncertain future demand

→ Estimate the likelihood of its

realization

↳ statistical analysis
of past data

* Probability Distributions (P.D)

Discrete P.D

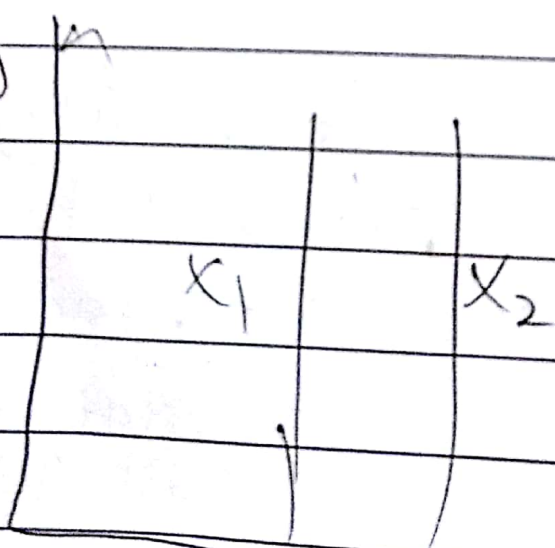
↳ Sum of products of scenario values & their probability.

Mean → Expected value.

S.D ⇒ How far the random values are from mean, avg.
↳ Spread out =

↳ Continuous Distribution
Group of scenarios rather than individual.

Probability Density



Normal Distribution

$-\infty$ to $+\infty$

2 Parameter



Values of X

Forecast \Rightarrow Distribution info

\rightarrow Mean & Std Dev, Range

Short term forecast \rightarrow more accurate
Aggregate \rightarrow

\hookrightarrow Company Capacity Requirements

Past Data \rightarrow Causal models & time series methods

Time Series \rightarrow Collection of past values
of variable

(2) Moving avg \Rightarrow Uncertainty

(3) Exponential smoothing \Rightarrow Need for forecasting
future events

* Moving Averages

Objective forecasting tools & subjective for...

\rightarrow Exponential smoothing

\rightarrow Descriptive statistics \rightarrow Mean
Std dev.

D

(Value-mean)²

\hookrightarrow P-1.

DH

\hookrightarrow D.

Chosen data points "move" and use most recent n data pts

Predictive Analysis

Mean
std dev

↳ Demand Dist

Mean for prediction

↳ Descriptive
Sample mean.

Descriptive

σ Can be adjusted

$$\sigma \neq \frac{s+s}{\sqrt{n}}$$

* Descriptive

$$\sigma = s + \frac{s}{\sqrt{n}}$$

← Samples

← predictive

Above

11.77

Des approach predictive

(Avg of Abs Error)

MAD \rightarrow Mean (Abs) Dev. \rightarrow cal error

MSE
Mean Sq. Error

Avg Sq error

Mean Abs % error

Week 1 Error & Bias \rightarrow -ve error & +ve error

\hookrightarrow moving of 10 periods

Forecast error

Abs value of error

Abs Error

Square Error

Demand

% Error

Trends & seasonality seasonal factors

MA(1)

MA(2)

MA(3)

Seasonal mean
 \rightarrow Overall mean

TRANSPORTATION

Linear Regression

$$y = a + bt$$

Parameter a & b chosen to minimize the avg square distance of the data \rightarrow Mean square error

Yellow Stone visitors

Mean \approx Demand
Seasonal mean

Airline

De Seasonal forecast

\hookrightarrow Domestic market

~~winter seasonal factor~~

Optimisation model

- Linear model = Zooter model
- Decision variables
- Level of uncertainty, Objective function
↳ profit

* solver

→ sum product (profit, unit to make)

$$NPV = \sum_{t=1}^T \frac{\text{Net Cash inflow}_t}{(1 + \text{discount rate})^n}$$

* Degree of uncertainty

Artificial Intelligence

* Intelligent agent

→ interacts with Environment through sensors and it can affect its state through its actuators

(1) Finance ⇒ Trading agent

E_{kv} → Stock, bond & Commodity mkt

(2) Robotics ⇒

→ Camera, microphone

(3) Web (Crawlers) → motors, voice
↳ Robots

Robot.txt

(3) Games ⇒ Smarter ⇒ Chess

(4) Medical ⇒ Diagnosis agent

(5) Web ⇒ search box ⇒ Relevant pages
(Google Search engine)

AI → Uncertainty management

- (a) Text to speech
- (b) speech recognition
- (c) Language translations

* Machine Learning

→ Learn models from data

↳ Bayes network

↳ Reason with know model

* Supervised Learning

↳

Classification → Naive Bayes

Regression → Linear regression

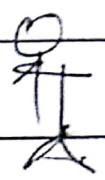
Clustering → K-means, Hierarchical

SRS, RTM, black box testing, components of EMS

ER flow, Agile thinking.

Use Case Modeling → Establish system boundary
→ functional requirements
→ visualizing, specify structure or behavior

Specifying, constructing, visualizing & documenting



user → defects

Verification → Doing the thing right
Efficiency → Building product right
Validation → Doing the right things
Effectiveness →

Historical data → Reports
OLAP ← Database mirror → Datawarehouse
OLTP → MRA → Datawarehouse