Key Concepts IM - .....

Inventory Management (Technische Universität München)

1. Introduction

- Gartner Analytics Trends
- The flow of goods and information
- Main questions
- Types of inventory
- Purpose of inventory
- Performance measures
- Cost categories
- ABC Analysis
- XYZ Analysis

2. Lot-sizing and safety stocks revisited

- The Trade-Off
- Economic Order Quantity (EOQ) Model
- Sensitivity Analysis of EOQ
- Quantity Discount Models
- Incremental quantity discounts
- Power-of-Two Policies
- Marketing – Operations Interface
- Heuristics: Wagner-Whitin Algorithm, Least unit cost (LUC), Silver-Meal (SM), Part period balancing (PP)
- Newsvendor Model
- The risk averse newsvendor

3. Inventory analytics: Demand modelling

- Chi-Square Test
- Kolmogorov-Smirnov-test
- Constant Model
- Forecast Accuracy: MAD, MSE, SIG
- (Linear) Trend Model
- Intermittent demand: Croston Method
- Causal Demand Forecasting
- Exponential distribution
- Serially correlated demand
- Machine Learning for Demand Prediction
- The Data Driven Newsvendor

4. Basic inventory control models

- Types of inventory control rules
- Periodic review (R,S)
- Continous review (s,Q)- and (s,S)-policy
- Lead times
- Parameters for the (R,S) policy

- Service levels: Non-stockout alpha, Fill rate beta, Adj. fill rate
- Stochastic lead time
- Safety stock formulas

- Parameters for the (R,S) policy
  - Service levels: Non-stockout alpha, Fill rate beta
  - Costs: Penalty cost per stockout occasion, per unit short; Successive or Simulataneous

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5. Supply chain inventory control

- Ordering policies: serial chain, distribution, assembly, general
- Ordering system: centralized vs. decentralized, periodic review vs. continuous
- Stock definitions
- Installation stock policy vs. Echelon stock policy
- Depot effect
- Portfolio effect
- Bullwhip effect: behavioural and operational causes
- Lehman wave
- Adaptive planning
- Two-stage lot sizing: sequential vs simultaneous planning
- Dynamic lot sizing: Base-stock-system, Clark-Scarf-model, METRIC

6. Multi-product inventory control

- Deterministic vs. stochastic models
- Warehouses scheduling model
- Economic production quantity (EPQ)
- Joint replenishment problem
- Dynamic joint replenishment
- Capacitated lot-sizing problem (CLSP)
- Discrete lot-sizing and scheduling problem (DLSP)
- Proportional lot-sizing and scheduling problem (PLSP)
- Multi-product newsvendor