IM Defs GPT - .....

Inventory Management (Technische Universität München)

Chapter 1: Introduction to Inventory Management

– Inventory Management: The process of efficiently overseeing and controlling the flow of goods, materials, and products within an organization's supply chain.
– Logistics: The management of the flow of goods and services from the point of origin to the point of consumption, encompassing planning, implementation, and control of various activities.
– Supply Chain Management: The coordination and integration of various activities involved in delivering products or services to customers, including procurement, production, transportation, warehousing, and distribution.
– Working Capital Management: The management of a company's short-term assets and liabilities to ensure efficient utilization of resources and meet operational requirements.
– Quantitative Decision Support: The use of mathematical and analytical tools to assist in making informed decisions based on data and models.
– Project and Research Work: Activities focused on applying knowledge and methods to solve specific problems or advance understanding in the field of inventory management.
– Inventory Turnover Ratio: A financial measure that indicates how efficiently inventory is being managed by comparing the cost of goods sold to the average inventory level.
– Inventory Days: A financial measure that calculates the average number of days it takes for inventory to be sold and replenished.
– Ordering Cost: The expenses incurred in the process of placing and receiving an order for inventory, including administrative costs, paperwork, and communication.
– Inventory Holding Cost: The cost associated with storing and maintaining inventory, including warehousing, insurance, obsolescence, and opportunity cost.
– Service Levels: The level of customer service or satisfaction achieved by fulfilling orders accurately and promptly.
– ABC-Analysis: A technique for categorizing items based on their importance or value, often using criteria such as annual consumption value or revenue contribution.
– XYZ-Analysis: A technique for categorizing items based on their demand patterns, typically classifying them as fast-moving, slow-moving, or non-moving items.

Chapter 2: Lot-sizing and Safety Stocks Revisited

– Economic Order Quantity (EOQ): The optimal order quantity that minimizes the total relevant cost by balancing inventory holding cost and setup (ordering) cost.
– Sensitivity Analysis: An analysis that explores the impact of varying parameters or assumptions on the outcomes of a model or decision.
– Quantity Discount Models: Models that consider discounts offered by suppliers based on the order quantity, such as all-unit quantity discounts and incremental quantity discounts.
– Power-of-Two Policies: Approaches that determine the optimal reorder interval as a multiple of a base planning period, often using power-of-two intervals.
– Marketing-Operations Interface: The interaction between marketing decisions (e.g., pricing, promotions) and operations decisions (e.g., lot-sizing, inventory control) in a coordinated manner.
– Dynamic Single Product Lot-Sizing: Determining the optimal lot sizes for a single product over a finite planning horizon, considering setup costs, holding costs, and inventory levels.

– Wagner-Whitin Algorithm: An algorithm based on dynamic programming that provides an optimal solution for the dynamic single product lot-sizing problem by considering total replenishment costs.

Chapter 3: Inventory Analytics: Demand Modelling

– Demand Uncertainty: The inherent variability and unpredictability of customer demand for products or services.
– Empirical Distributions: Probability distributions derived from historical or observed data.
– Theoretical Distributions: Probability distributions based on mathematical models or theoretical assumptions.
– Goodness-of-Fit Tests: Statistical tests used to assess whether a given distribution accurately represents the observed data.
– Maximum Likelihood Estimation: A method for estimating the parameters of a probability distribution by maximizing the likelihood of the observed data.
– Forecasting Methods: Techniques used to predict future demand based on historical data and other relevant factors.
– Forecast Error Distributions: The distribution of errors or discrepancies between forecasted and actual demand.
– Constant Models: Demand models that assume a constant demand rate over time.
– Moving Averages: Forecasting models that calculate the average demand over a specified period to smooth out fluctuations.
– Exponential Smoothing: A forecasting technique that assigns exponentially decreasing weights to past observations to give more weight to recent data.
– Demand Patterns: Different types of demand behavior or trends, such as constant, increasing, decreasing, or seasonal patterns.

Chapter 4: Inventory Analytics: Demand Modelling

– Inventory Control Models: Mathematical models used to determine when and how much to order in order to optimize inventory levels and costs.
– Order-Up-To Policy: An inventory control rule where orders are placed to bring inventory levels up to a predetermined target level at fixed time intervals (periodic review).
– Reorder-Point-Order-Quantity Policy: An inventory control rule where orders are placed when the inventory level reaches a predetermined reorder point (continuous review), and the order quantity is fixed.
– Reorder-Point-Order-Up-To Policy: An inventory control rule where orders are placed when the inventory level reaches a predetermined reorder point (continuous review), and the order quantity brings the inventory level up to a predetermined target level.
– Lead Time Estimation: The process of estimating the time between placing an order and receiving the inventory.
– Lead Time Demand Modelling: Modelling the demand during the lead time (the time it takes for an order to be delivered).
– Service Level Measures: Performance measures that quantify the desired level of customer service, such as non-stockout probability, fill rate, and adjusted fill rate.
– Safety Stock: Additional inventory held to mitigate the risk of stockouts due to demand variability or lead time uncertainty.

– Cost Optimization: The process of minimizing costs associated with inventory control, including ordering costs, holding costs, and shortage penalties.
– Lot Size: The quantity of items ordered in a single purchase order or production run.
– Shortage Penalties: The costs incurred when demand exceeds the available inventory and customers are not served.

Chapter 5: Supply Chain Inventory Control

– Ordering Policies: Strategies and rules governing when and how much to order in a supply chain context.
– Replenishment Policies: Policies that determine how inventory is replenished at different stages of the supply chain.
– Inventory Rationing: The allocation of limited inventory among multiple customers or locations to balance demand and supply.
– Multi-Echelon Inventory Control: Inventory control decisions made at multiple levels or stages in a supply chain, considering interdependencies and coordination.
– Bullwhip Effect: The amplification of demand variability as it propagates upstream in a supply chain, leading to increased inventory and inefficiencies.
– Beer Distribution Game: A simulation game used to illustrate the challenges of managing inventory and coordinating activities in a supply chain.
– Demand Variability: The extent of fluctuations or variations in customer demand over time.
– Backorders: Orders that cannot be immediately fulfilled due to insufficient inventory and are scheduled for later delivery.
– Delays: Time lags or interruptions in the flow of goods or information within a supply chain.
– Supply Chain Design: The strategic configuration and arrangement of supply chain elements to optimize performance and achieve specific objectives.
– Information Policies: The rules and guidelines for sharing, processing, and utilizing information within a supply chain.
– Reordering Strategies: Approaches and tactics for determining when and how to place new orders to replenish inventory in a supply chain context.

Chapter 6: Multi-Product Inventory Control

– Warehouse Scheduling Problem: The problem of scheduling the replenishment and storage of multiple products within a warehouse while considering capacity constraints.
– Replenishment Strategies: Approaches for managing the timing and quantity of replenishment orders for multiple products.
– Dedicated Space: Allocating specific storage space exclusively for each product in a warehouse.
– Average Utilization: Managing warehouse space based

on the average utilization across multiple products.
– Fill Rate: The percentage of demand fulfilled immediately from inventory, without any backorders or stockouts.

– Allocation Rules: Policies or algorithms used to allocate available inventory among different demand sources or customers.
– Lost Sales: Sales that are lost due to stockouts or unavailability of inventory.
– Joint Replenishment: Coordinating the replenishment of multiple products together to achieve economies of scale and reduce costs.
– Inventory Pooling: Consolidating inventory from multiple products to serve overall demand more efficiently and effectively.
– Inventory Diversification: Spreading inventory investments across a diverse range of products to mitigate risk and enhance overall performance.
– SKU (Stock Keeping Unit): A unique identifier assigned to each distinct item or product for inventory management purposes.
– Coordination Mechanisms: Processes or mechanisms implemented to coordinate actions and decisions among different entities or stakeholders in a supply chain.