IM Summary GPT - .....

Inventory Management (Technische Universität München)

Chapter 1: Introduction to Inventory Management

This chapter serves as an introduction to the field of inventory management and its role in logistics and supply chain management. It provides an overview of the course content and learning objectives, including the acquisition of strategies and methodologies for effective working capital management. The chapter mentions recommended books and additional texts for further reading, and outlines the organizational aspects of the course, such as lectures, exercises, and grading. It also briefly discusses inventory management trends, consulting statements on reducing inventory, and provides financial data from companies like Wal-Mart, Boeing, and Siemens. The chapter introduces the flow of goods and information in inventory management, types of inventory, and performance measures. It also highlights recent developments and research in the field, such as digitalization and behavioral inventory management, and discusses the applications and challenges of inventory management in various industries.

Chapter 2: Lot-sizing and Safety Stocks Revisited

This chapter focuses on lot-sizing and safety stocks in logistics and supply chain management. It covers topics such as the Economic Order Quantity (EOQ) model, sensitivity analysis of EOQ, quantity discount models, power-of-two policies, marketing-operations interface, dynamic single product lot-sizing, and the Wagner-Whitin algorithm. The chapter explains the EOQ model as a way to determine the optimal order quantity that minimizes relevant costs. It discusses sensitivity analysis to explore the impact of deviating from the EOQ. Quantity discount models are introduced, considering discounts offered by suppliers based on order quantity. The power-of-two policies are presented as an approach to determining the optimal reorder interval. The chapter also explores the interplay between marketing and operations decisions, and different approaches to single product lot-sizing over a finite planning horizon. The Wagner-Whitin algorithm is explained as an optimal solution for the dynamic single product lot-sizing problem. Overall, the chapter covers various models and approaches to optimize lot-sizing and safety stocks.

Chapter 3: Inventory Analytics: Demand Modelling

This chapter focuses on inventory analytics, specifically demand modeling. It explains the concept of demand uncertainty and different approaches to modeling demand, such as empirical and theoretical distributions. The chapter discusses parameter estimation for these distributions, including goodness-of-fit tests and moment fitting procedures. It introduces the chi-square test and the Kolmogorov-Smirnov test as methods for testing distribution hypotheses. The chapter also covers forecasting methods and forecast error distributions. It concludes by presenting different scenarios and discussing appropriate demand modeling approaches for each scenario, such as constant models, moving averages, and exponential smoothing. The chapter provides an overview of demand modeling techniques and their application in inventory analytics.

Chapter 4: Inventory Analytics: Inventory Control Models

This chapter provides an overview of basic inventory control models in logistics and supply chain management. It addresses questions of when to review, when to place an order, and how much to order. The chapter introduces different types of inventory control rules, such as the order-up-to policy, the reorder-point-order-quantity policy, and the reorder-point-order-up-to policy. It discusses lead time estimation, lead time demand modeling, and heuristic parameter setting methods for inventory control policies. The chapter covers service level measures and safety stock formulas. It also addresses cost optimization for given lot sizes, including ordering costs, holding costs, and shortage penalties. The chapter summarizes basic concepts and models related to inventory control.

Chapter 5: Supply Chain Inventory Control

This chapter focuses on supply chain inventory control and its various aspects. It discusses ordering policies, replenishment policies, inventory rationing, multi-echelon inventory control decisions, and the bullwhip effect. The chapter mentions the beer distribution game as a simulation game to illustrate the challenges of supply chain management. It raises questions about demand variability, backorders, delays, supply chain design, information policies, and reordering strategies. The chapter

explains the bullwhip effect, which refers to the increasing variability of demand as it moves upstream in the supply chain. It provides an overview of supply chain inventory control and highlights important considerations and challenges in managing inventories effectively.

Chapter 6: Multi-Product Inventory Control

This chapter discusses multi-item inventory control. It covers topics such as the warehouse scheduling problem, rotation (common) cycle, economic production quantity (EPQ), economic lot scheduling problem, joint replenishment problem, dynamic joint replenishment, capacitated lot-sizing problem (CLSP), and discrete lot-sizing and scheduling problem (DLSP). The chapter explores optimization problems and solution approaches for multi-item inventory control. It discusses the warehouse scheduling problem with assumptions about multiple products, warehouse capacity, and replenishment strategies. The rotation cycle is explained, along with the EPQ model and economic lot scheduling problem. The chapter addresses the joint replenishment problem and dynamic joint replenishment in the context of dynamic demands. It also covers the CLSP and DLSP, considering finite production rates and sequencing decisions. The chapter provides examples and covers various aspects of multi-item inventory control.