Certificate in Production Planning and Control (United Kingdom)

Inventory Management

ABC (Activity-Based Costing)
Related terms: cost drivers, overhead allocation, product costing
Explanation: ABC assigns indirect costs to products based on the activities that generate them, rather than using a single volume-based rate. By identifying cost drivers such as machine setups or inspections, managers can see how each activity consumes resources.
Example: A manufacturer uses ABC to allocate setup costs to each batch of printed circuit boards, revealing that high-mix, low-volume products consume disproportionate setup time.
Practical application: Enables more accurate pricing, supports make-or-buy decisions, and highlights non-value-adding activities for process improvement.
Challenges: Requires detailed data collection, can be complex to maintain, and may meet resistance from staff accustomed to traditional costing methods.

Backorder
Related terms: order fulfillment, stockout, lead time
Explanation: A backorder occurs when a customer order cannot be satisfied immediately because the required inventory is unavailable, prompting the order to be queued until stock arrives.
Example: A retailer receives an order for 200 units of a seasonal sweater, but only 120 are on hand; the remaining 80 are placed on backorder pending the next shipment.
Practical application: Allows businesses to retain sales rather than lose them outright, and provides visibility into demand that exceeds current supply.
Challenges: Managing customer expectations, communicating realistic delivery dates, and ensuring that backordered items are replenished promptly to avoid erosion of goodwill.

Cycle Counting
Related terms: physical inventory, perpetual inventory system, audit frequency
Explanation: Cycle counting is a periodic inventory audit technique where a small subset of items is counted on a rotating schedule, rather than conducting a full physical count annually.
Example: A distribution centre counts all fast-moving SKUs weekly, medium-turn items monthly, and slow-moving items quarterly.
Practical application: Improves inventory accuracy, reduces disruption to operations, and helps detect discrepancies early.
Challenges: Selecting the appropriate counting frequency, training staff to perform accurate counts, and integrating count results into the inventory management system without delay.

Demand Forecasting
Related terms: sales projection, statistical modelling, forecasting horizon
Explanation: Demand forecasting predicts future customer demand using historical sales data, market trends, and statistical techniques such as moving averages, exponential smoothing, or regression analysis.

Example: A clothing manufacturer uses a 12-month moving average to estimate the quantity of denim jackets needed for the upcoming winter season.
Practical application: Guides production planning, inventory replenishment, and capacity allocation, reducing the risk of excess or insufficient stock.
Challenges: Dealing with volatile demand patterns, incorporating promotional effects, and maintaining forecast accuracy amidst changing market conditions.

Economic Order Quantity (EOQ)
Related terms: total cost, ordering cost, holding cost
Explanation: EOQ is a formula that determines the optimal order size minimizing the sum of ordering and holding costs, assuming constant demand and lead time.
Example: A parts supplier calculates EOQ as √[(2 × annual demand × ordering cost) / holding cost] and finds the optimal order quantity of 1,200 units.
Practical application: Provides a baseline for order sizing, aids in budgeting, and supports negotiations with suppliers on batch sizes.
Challenges: Assumes stable demand and lead time, which may not hold in dynamic environments; requires accurate cost data to be effective.

Fixed Order Quantity (FOQ)
Related terms: reorder point, batch production, inventory policy
Explanation: FOQ is an inventory policy where a constant quantity is ordered each time the inventory position falls to or below a predetermined reorder point.
Example: A bakery orders 500 kg of flour each time the on-hand stock drops to 200 kg, regardless of current demand fluctuations.
Practical application: Simplifies ordering processes, aligns with production batch sizes, and can reduce ordering complexity.
Challenges: May lead to over-stocking or stockouts if demand varies significantly; requires careful selection of reorder point to balance service level and carrying cost.

Just-In-Time (JIT)
Related terms: lean manufacturing, pull system, waste reduction
Explanation: JIT is a production strategy that seeks to minimize inventory by delivering materials and components exactly when they are needed in the production process.
Example: An automobile assembly plant receives chassis components from suppliers on the same day they are scheduled to be assembled, eliminating the need for on-site storage.
Practical application: Reduces holding costs, improves cash flow, and enhances responsiveness to demand changes.
Challenges: Relies heavily on reliable suppliers, accurate demand forecasting, and robust logistics; any disruption can halt production.

Kanban
Related terms: visual signalling, pull system, work-in-process (WIP) limits
Explanation: Kanban is a visual scheduling system that uses cards or electronic signals to trigger production

or replenishment when inventory reaches a defined level.
Example: A electronics manufacturer places a green card on the board when the inventory of printed circuit boards falls to the minimum threshold, prompting the shop floor to produce a new batch.
Practical application: Facilitates smooth flow, limits overproduction, and provides real-time visibility of inventory status.
Challenges: Requires disciplined adherence to WIP limits, clear communication among departments, and may need system integration for larger operations.

Lead Time
Related terms: order cycle, supplier delivery time, production lead time
Explanation: Lead time is the elapsed time between the initiation of a process (such as placing an order) and its completion (receipt of goods). It includes order processing, manufacturing, and transportation phases.
Example: A retailer experiences a 14-day lead time from placing an order with a supplier to receiving the finished goods at the warehouse.
Practical application: Critical for setting reorder points, safety stock levels, and planning production schedules.
Challenges: Variability in lead time can cause inventory inaccuracies; external factors such as customs delays or supplier capacity constraints can increase uncertainty.

Minimum Order Quantity (MOQ)
Related terms: batch size, supplier contract, economies of scale
Explanation: MOQ is the smallest quantity a supplier is willing to sell in a single order, often set to ensure profitability for low-cost items.
Example: A textile supplier requires a MOQ of 10 000 meters of fabric per order, influencing the buyer's production batch decisions.
Practical application: Helps negotiate better unit prices, aligns with batch production requirements, and can simplify supplier management.
Challenges: May force the buyer to hold excess inventory, increase holding costs, or limit flexibility in responding to demand changes.

Net Stock
Related terms: on-hand inventory, allocated stock, available quantity
Explanation: Net stock is the quantity of inventory physically present in the warehouse after deducting allocated or reserved quantities for open orders.
Example: A warehouse has 1,200 units of a component on hand, but 300 units are allocated to pending orders; the net stock is 900 units.
Practical application: Provides an accurate figure for planning replenishment, avoiding over-commitment of inventory.
Challenges: Requires real-time data synchronization between order management and inventory systems to prevent discrepancies.

Obsolete Inventory
Related terms: dead stock, write-off, inventory turnover

Explanation: Obsolete inventory refers to items that are no longer sellable or usable due to technological change, expiry, or demand loss, and therefore have little or no economic value.
Example: A retailer holds a stock of CRT televisions that cannot be sold because the market has shifted to flat-panel displays.
Practical application: Identifying obsolete stock enables timely write-offs, recovery of salvage value, and space reclamation.
Challenges: Detecting obsolescence early, managing the financial impact of write-offs, and implementing strategies such as liquidation or donation.

Pareto Analysis
Related terms: 80/20 rule, ABC classification, inventory prioritisation
Explanation: Pareto analysis is a statistical technique that identifies the most significant factors in a dataset, often revealing that a small proportion of items accounts for a large share of value or risk.
Example: An analysis shows that 20 % of SKUs generate 80 % of total sales revenue, guiding focus on high-value items.
Practical application: Supports inventory optimisation, prioritises auditing efforts, and drives targeted improvement initiatives.
Challenges: Requires accurate data collection, may overlook emerging items, and can lead to neglect of low-volume but strategically important products.

Reorder Point (ROP)
Related terms: safety stock, inventory position, replenishment trigger
Explanation: The reorder point is the inventory level at which a new order should be placed to replenish stock before it runs out, calculated as demand during lead time plus safety stock.
Example: If weekly demand is 500 units and lead time is two weeks, with a safety stock of 200 units, the ROP is (500 × 2) + 200 = 1,200 units.
Practical application: Automates ordering decisions, reduces stockouts, and aligns replenishment with consumption patterns.
Challenges: Inaccurate demand forecasts or lead-time variability can cause the ROP to be set too high or too low, impacting service levels and inventory costs.

Safety Stock
Related terms: buffer inventory, service level, demand variability
Explanation: Safety stock is extra inventory held to protect against uncertainties in demand or supply, ensuring a desired service level is maintained.
Example: A distributor keeps an additional 300 units of a fast-moving product as safety stock to cover unexpected spikes in demand.
Practical application: Improves order fulfilment reliability, reduces risk of stockouts, and supports continuity in production.
Challenges: Determining the optimal level requires statistical analysis; excess safety stock ties up capital and increases holding costs.

Stock Keeping Unit (SKU)

Related terms: product code, inventory identifier, barcode
Explanation: A SKU is a unique alphanumeric identifier assigned to each distinct product variant (size, colour, packaging) for inventory tracking and sales analysis.
Example: A shoe retailer assigns SKU 001-BL-42 to a size-42, blue, men's sneaker model.
Practical application: Enables precise inventory control, facilitates demand analysis, and supports efficient order picking.
Challenges: Managing large SKU assortments can increase complexity, require robust data governance, and lead to higher carrying costs if not rationalised.

Total Cost of Ownership (TCO)
Related terms: lifecycle cost, procurement analysis, hidden costs
Explanation: TCO evaluates all direct and indirect costs associated with acquiring, operating, and disposing of an asset over its useful life, beyond the purchase price.
Example: A manufacturing firm calculates TCO for a new CNC machine, including purchase price, installation, training, maintenance, energy consumption, and eventual resale value.
Practical application: Informs strategic sourcing decisions, justifies investments, and highlights cost-saving opportunities in the supply chain.
Challenges: Gathering comprehensive cost data, estimating future expenses accurately, and integrating TCO analysis into procurement processes.

Vendor Managed Inventory (VMI)
Related terms: collaborative planning, supplier responsibility, inventory replenishment
Explanation: VMI is a partnership where the supplier monitors the customer's inventory levels and takes responsibility for replenishment, often using shared data platforms.
Example: A beverage manufacturer allows its bottling partner to automatically reorder raw material cartons when stock falls below a predefined threshold.
Practical application: Reduces stockouts, improves inventory turnover, and shifts forecasting burden to the supplier.
Challenges: Requires high trust, data transparency, and clear performance metrics; potential loss of control over inventory decisions.

Warehouse Management System (WMS)
Related terms: inventory software, order picking, location control
Explanation: A WMS is a software solution that manages warehouse operations, including receiving, put-away, picking, shipping, and inventory tracking, often integrating with ERP and WMS modules.
Example: A e-commerce fulfilment centre uses a WMS to optimise pick paths, allocate storage locations, and generate real-time inventory reports.
Practical application: Enhances accuracy, increases throughput, and provides analytics for continuous improvement.
Challenges: Implementation cost, change management, and ensuring compatibility with existing technology infrastructure.

ABC Classification

Related terms: inventory categorisation, Pareto analysis, inventory control
Explanation: ABC classification groups inventory items into three categories (A, B, C) based on criteria such as annual consumption value, with ‘A’ items being the most valuable and tightly controlled.
Example: A retailer classifies 10 % of SKUs as ‘A’ items, which account for 70 % of sales value, focusing frequent audits on these.
Practical application: Directs resources to high-impact items, improves audit efficiency, and informs safety-stock policies.
Challenges: Determining appropriate classification thresholds, updating classifications as demand patterns change, and avoiding neglect of lower-class items that may become critical.

Batch Production
Related terms: lot sizing, production run, setup time
Explanation: Batch production involves manufacturing a set quantity of a product before switching to another product, allowing economies of scale in setup and processing.
Example: A bakery produces a batch of 5,000 loaves of sourdough before changing ovens for a different bread type.
Practical application: Reduces per-unit setup cost, simplifies scheduling, and enables efficient use of equipment.
Challenges: Balancing batch size with demand variability, managing inventory holding costs for finished goods, and avoiding over-production.

Cross-Docking
Related terms: transshipment, inbound logistics, distribution centre
Explanation: Cross-docking is a logistics practice where incoming goods are directly transferred from receiving to shipping docks, with minimal or no storage, to accelerate delivery.
Example: A retailer receives pallets of seasonal apparel and immediately loads them onto outbound trucks for store distribution, bypassing warehouse storage.
Practical application: Decreases handling costs, shortens order cycle time, and improves inventory turnover.
Challenges: Requires precise coordination, real-time information flow, and reliable transportation scheduling; mismatches can cause bottlenecks.

Demand-Driven MRP (DDMRP)
Related terms: buffer zones, dynamic planning, pull-based scheduling
Explanation: DDMRP combines traditional MRP with demand-driven principles, using strategically placed inventory buffers to protect against variability and decouple supply from demand.
Example: A chemical manufacturer implements DDMRP, establishing buffer stocks at critical process steps to absorb demand spikes without triggering excessive production.
Practical application: Improves responsiveness, reduces lead-time variance, and stabilises the supply chain.
Challenges: Requires re-engineering of planning processes, accurate buffer sizing, and cultural shift towards a pull-oriented mindset.

Economic Production Quantity (EPQ)
Related terms: production lot size, setup cost, carrying cost

Explanation: EPQ extends the EOQ model to production environments where items are manufactured continuously, calculating the optimal batch size that minimises total cost.
Example: A metal-fabrication shop computes EPQ to determine that producing 2,500 units per run balances setup expenses with inventory holding costs.
Practical application: Supports efficient scheduling, reduces setup frequency, and aligns production with demand forecasts.
Challenges: Assumes constant production rate and demand; deviations can affect the cost optimality of the calculated quantity.

Fill Rate
Related terms: service level, order fulfilment, backorder rate
Explanation: Fill rate measures the proportion of customer demand that is satisfied from on-hand inventory without delay, typically expressed as a percentage.
Example: A wholesaler achieves a 95 % fill rate by delivering 950 out of 1,000 ordered items directly from stock.
Practical application: Serves as a key performance indicator for inventory effectiveness and customer satisfaction.
Challenges: High fill rates may require excess safety stock; balancing cost against service level is essential.

Gross Margin Return on Investment (GMROI)
Related terms: profitability, inventory turnover, financial metric
Explanation: GMROI evaluates the profit generated per unit of inventory investment, calculated as gross margin divided by average inventory cost.
Example: A retailer with a gross margin of £150,000 and average inventory cost of £75,000 attains a GMROI of 2.0, indicating £2 of profit for every £1 invested in inventory.
Practical application: Helps assess the efficiency of inventory utilisation and guides assortment planning.
Challenges: Accurate measurement of gross margin and inventory cost, and accounting for seasonal fluctuations.

Inventory Turnover
Related terms: stock rotation, days of inventory, sales velocity
Explanation: Inventory turnover is the ratio of cost of goods sold (COGS) to average inventory, indicating how many times inventory is sold and replaced over a period.
Example: A retailer with COGS of £500,000 and average inventory of £125,000 records an inventory turnover of 4.0, meaning stock is refreshed four times annually.
Practical application: Highlights inventory efficiency, informs purchasing decisions, and aids in cash-flow management.
Challenges: Over-emphasis can lead to stockouts; low turnover may signal over-stocking or obsolescence.

Just-In-Case (JIC)
Related terms: safety stock, risk mitigation, buffer inventory
Explanation: JIC is an inventory strategy that deliberately holds extra stock to guard against supply disruptions or demand spikes, opposite to JIT.

Example: A pharmaceutical company maintains a JIC buffer of critical raw materials to ensure continuous production despite potential supplier delays.
Practical application: Provides resilience, supports compliance with regulatory requirements, and reduces the risk of production halts.
Challenges: Increases holding costs, may tie up capital, and requires careful balance to avoid unnecessary excess.

Lot-Sizing
Related terms: batch production, order quantity, optimisation
Explanation: Lot-sizing determines the optimal quantity of items to produce or order in each batch, considering factors such as setup costs, demand variability, and holding costs.
Example: An ERP system suggests a lot size of 3,000 units for a component based on the Wagner-Whitin algorithm.
Practical application: Reduces total cost, aligns production with demand, and supports capacity planning.
Challenges: Complex calculations for multi-item, multi-period environments; inaccurate demand forecasts can undermine optimal lot sizes.

Material Requirements Planning (MRP)
Related terms: bill of materials, lead time, master production schedule
Explanation: MRP is a computerized planning system that calculates material and component requirements based on the master production schedule, inventory levels, and the bill of materials.
Example: An electronics firm uses MRP to generate purchase orders for resistors and capacitors needed for the upcoming production run of circuit boards.
Practical application: Synchronises supply with production, reduces stockouts, and enables efficient procurement.
Challenges: Relies on accurate data; errors in BOM or lead-time assumptions can cause ripple effects throughout the schedule.

Net-Present-Value (NPV) of Inventory Investment
Related terms: discount rate, cash-flow analysis, financial appraisal
Explanation: NPV evaluates the profitability of an inventory investment by discounting future cash flows associated with holding, ordering, and selling inventory to present-day value.
Example: A retailer calculates the NPV of a new safety-stock policy, discounting expected holding costs and additional sales revenue over five years.
Practical application: Assists in making financially sound inventory decisions, comparing alternatives such as JIT versus JIC.
Challenges: Selecting an appropriate discount rate, forecasting future cash flows accurately, and accounting for non-financial benefits.

Obsolescence Risk Assessment
Related terms: product lifecycle, demand forecasting, inventory ageing
Explanation: This assessment evaluates the likelihood that inventory will become obsolete, considering factors like technology trends, market saturation, and product expiry dates.

Example: A tech distributor uses a scoring model to flag items with a high obsolescence risk, prompting accelerated sales or discounting.
Practical application: Enables proactive inventory reduction, reduces write-off exposure, and informs procurement strategies.
Challenges: Requires continuous monitoring of market trends, accurate ageing data, and coordination across sales and supply functions.

Perpetual Inventory System
Related terms: real-time tracking, barcode scanning, inventory accuracy
Explanation: A perpetual inventory system continuously updates inventory records as transactions occur, providing up-to-date stock levels without the need for periodic physical counts.
Example: A retail chain uses handheld scanners that automatically adjust inventory balances upon each sale.
Practical application: Improves visibility, supports timely replenishment, and reduces reliance on manual stocktakes.
Challenges: System integration, data entry errors, and the need for robust audit controls to detect discrepancies.

Physical Inventory Count
Related terms: stock audit, cycle counting, inventory reconciliation
Explanation: A physical inventory count involves manually verifying the quantity of each item on hand, typically performed annually or at key intervals to validate system records.
Example: At year-end, a warehouse shuts down operations for a weekend to conduct a full physical count of all SKUs.
Practical application: Confirms data integrity, identifies shrinkage, and satisfies regulatory requirements.
Challenges: Disruptive to operations, labor-intensive, and prone to human error if not carefully planned.

Replenishment Strategy
Related terms: reorder point, periodic review, continuous review
Explanation: A replenishment strategy defines how and when inventory is restocked, encompassing policies such as continuous review (triggered by ROP) or periodic review (ordered at fixed intervals).
Example: A grocery store adopts a periodic review system, ordering fresh produce every Monday based on projected weekly demand.
Practical application: Aligns ordering with demand patterns, optimises ordering costs, and maintains service levels.
Challenges: Selecting the appropriate review frequency, handling demand volatility, and integrating with supplier lead times.

Safety Stock Calculation
Related terms: service level, demand variability, standard deviation
Explanation: Safety stock is calculated using statistical methods that factor in desired service level, demand variability, and lead-time uncertainty, often employing the formula: safety stock = $Z \times \sigma \times \sqrt{L}$.
Example: For a 95 % service level ($Z = 1.65$), demand standard deviation of 30 units, and lead time of 4 days, safety stock equals $1.65 \times 30 \times \sqrt{4} = 99$ units.

Practical application: Provides a quantitative basis for buffer inventory, enhancing reliability.
Challenges: Requires accurate statistical data, may need frequent updates as demand patterns evolve.

Stockout Cost
Related terms: lost sales, backorder cost, customer dissatisfaction
Explanation: Stockout cost quantifies the financial impact of being unable to fulfil demand, including lost revenue, expedited shipping, and damage to customer relationships.
Example: A retailer estimates a stockout cost of £5 per missed sale, factoring in lost profit and potential future churn.
Practical application: Informs inventory optimisation models by assigning a penalty to stockouts, balancing against holding costs.
Challenges: Difficult to measure intangible effects, such as brand reputation, and may vary across product categories.

Turnover Ratio
Related terms: inventory turnover, days of inventory, sales velocity
Explanation: Turnover ratio is another term for inventory turnover, representing the number of times inventory cycles through in a given period.
Example: A fashion retailer with a turnover ratio of 6 indicates that inventory is sold and replaced six times per year.
Practical application: Benchmarks performance against industry standards, aiding strategic planning.
Challenges: High ratios may indicate insufficient stock, while low ratios suggest over-stocking; context matters.

Vendor Lead Time
Related terms: supplier performance, order cycle, inbound logistics
Explanation: Vendor lead time is the period between a purchase order being placed with a supplier and the receipt of goods at the buyer’s location.
Example: A parts supplier promises a vendor lead time of 10 business days for standard components.
Practical application: Critical for calculating reorder points and safety stock; influences production scheduling.
Challenges: Variability due to transportation, customs, or supplier capacity can disrupt planning; requires close supplier collaboration.

Work-In-Process (WIP) Inventory
Related terms: production floor, bottleneck, flow efficiency
Explanation: WIP inventory consists of items that have entered the production process but are not yet completed, representing partially finished goods.
Example: A car assembly line has 150 chassis frames awaiting paint, constituting WIP inventory.
Practical application: Monitoring WIP helps identify bottlenecks, balance workloads, and improve overall equipment effectiveness.
Challenges: Excessive WIP ties up capital, increases lead time, and can mask underlying production inefficiencies.