Operations Management Cheatsheet

A concise reference guide covering key concepts, tools, and techniques in Operations Management. From forecasting and inventory management to quality control and process design, this cheat sheet provides a quick overview of essential topics for efficient business operations.

Fundamentals of Operations Management

Key Concepts

Operations Management (OM)	The design, operation, and improvement of the systems that create and deliver the firm's primary products and services.
Supply Chain	The sequence of processes involved in the production and distribution of a commodity.
Value Chain	A high-level model of how businesses receive raw materials as input, add value to the raw materials through various processes, and sell finished products to customers.
Efficiency	Performing activities at the lowest possible cost.
Effectiveness	Doing the right things to create the most value for the company.
Productivity	A measure of how well resources are used. Calculated as Output / Input.

Types of Operations

Goods vs. Services

- **Goods**: Tangible products.
- **Services**: Intangible activities that provide a benefit.

Pure Goods vs. Core Goods

- **Pure Goods**: Food products, chemicals, mining.
- **Core Goods**: Appliances, data storage systems, automobiles.

Pure Services vs. Core Services

- **Pure Services**: Teaching, medical advice, financial consulting.
- **Core Services**: Hotels, airlines, internet service providers.

Efficiency and Effectiveness in Operations

- Balancing cost reduction with value creation is crucial.

Operations Strategy

Definition	Setting broad policies and plans for using the resources of a firm to best support its long-term competitive strategy.
Competitive Dimensions	- **Cost**: Low-cost provider. - **Quality**: High performance or consistent quality. - **Delivery Speed**: Fast delivery. - **Delivery Reliability**: On-time delivery. - **Coping with Changes**: Flexibility and new-product introduction speed.
Trade-offs	Management must decide which parameters of performance are critical and concentrate resources on those characteristics.

Forecasting and Demand Management

Forecasting Methods

Qualitative Methods	Subjective forecasts that incorporate such factors as expert opinions and personal experiences. Useful when past data is unavailable.
Time Series Analysis	Using historical data to predict future demand. Assumes that past patterns will continue in the future.
Causal Relationship Forecasting	Forecasting using independent variables other than time to predict future demand.
Simulation	Using computer software to model alternative scenarios and forecast demand under different conditions.

Time Series Forecasting

Simple Moving Average	Forecast is the average of a fixed number of past periods. $F_t = (A_{t-1} + A_{t-2} + … + A_{t-n}) / n$ Where: - F_t = Forecast for period t - A_{t-i} = Actual value in period t-i - n = Number of periods in the average
Weighted Moving Average	Assigns different weights to each period's data based on importance. $F_t = w_1 A_{t-1} + w_2 A_{t-2} + … + w_n A_{t-n}$ Where: - w_i = Weight for period i
Exponential Smoothing	Averages past demand with a forecast of past demand. $F_t = F_{t-1} + α(A_{t-1} - F_{t-1})$ Where: - α = Smoothing constant (0 < α < 1)

Forecast Error

Mean Absolute Deviation (MAD)	Average of the absolute differences between the actual demand and the forecast. $MAD = Σ|A_t - F_t| / n$
Mean Squared Error (MSE)	Average of the squared differences between the actual demand and the forecast. $MSE = Σ(A_t - F_t)^2 / n$
Mean Absolute Percentage Error (MAPE)	Average of the absolute percentage differences between the actual demand and the forecast. $MAPE = Σ(|A_t - F_t| / A_t) * 100 / n$

Inventory Management

Inventory Types

Raw Materials	
• Input materials that are used in the production process.	
Work-in-Process (WIP)	
• Partially completed products in the manufacturing process.	
Finished Goods	
• Completed products ready for sale to customers.	
Maintenance, Repair, and Operating (MRO)	
• Items used to support production and operations.	

Inventory Costs

Holding (Carrying) Costs	Costs for storage, handling, insurance, and so on.
Setup (Production Change) Costs	Costs for arranging specific equipment setups, and so on.
Ordering Costs	Costs for placing an order and receiving goods.
Shortage Costs	Costs for running out of stock.

Inventory Models

Economic Order Quantity (EOQ)	Determines the optimal order size to minimize total inventory costs. $EOQ = \sqrt{(2DS)\ /\ H}$ Where: • D = Annual demand • S = Ordering cost per order • H = Holding cost per unit per year
Reorder Point (ROP)	Determines when to reorder inventory. $ROP = d * L$ Where: • d = Average daily demand • L = Lead time in days
Safety Stock	Extra inventory held to protect against uncertainties in demand or lead time.

Quality Management and Process Improvement

Quality Definitions

Quality	The ability of a product or service to consistently meet or exceed customer expectations.
Dimensions of Quality (Goods)	• Performance • Features • Reliability • Durability • Serviceability • Aesthetics • Perceived Quality
Dimensions of Quality (Services)	• Reliability • Responsiveness • Competence • Access • Courtesy • Communication • Credibility • Security • Understanding the Customer • Tangibles

Quality Tools

Cause-and-Effect Diagrams (Fishbone Diagrams)	
• Used to identify potential causes of a problem.	
Check Sheets	
• Used to collect and organize data.	
Control Charts	
• Used to monitor a process and determine whether it is in control.	
Histograms	
• Used to display the distribution of data.	
Pareto Charts	
• Used to identify the most important causes of a problem (80/20 rule).	
Scatter Diagrams	
• Used to examine the relationships between variables.	
Flowcharts	
• Used to map out the steps in a process.	

Process Improvement Methodologies

Six Sigma	A disciplined, data-driven approach for eliminating defects in any process. Uses the DMAIC (Define, Measure, Analyze, Improve, Control) methodology.
Lean Manufacturing	Focuses on eliminating waste (muda) from all aspects of the manufacturing process.
Total Quality Management (TQM)	A management approach focused on continuous improvement and customer satisfaction.