

OM4 –Sales and operations planning

Module III

Aggregate Planning

Aggregate planning is a key concept in operations management that involves developing, analyzing, and maintaining a preliminary, approximate schedule of the overall operations of an organization. It typically covers a time frame of several months to a year, aiming to balance supply and demand while considering various factors such as production capacity, labor availability, inventory levels, and customer demand forecasts

The main objectives of aggregate planning are to:

Meet customer demand: Ensure that the organization can fulfill customer orders in a timely manner while minimizing stock outs or backorders.

Optimize resources: Efficiently allocate resources such as labor, equipment, and materials to meet production goals without incurring excessive costs or underutilization.

Minimize costs: Balance the costs associated with hiring, training, overtime, inventory holding, subcontracting, and other operational activities to achieve the most cost-effective plan.

Maintain flexibility: Anticipate and adapt to changes in demand, market conditions, or internal constraints while still meeting operational goals.

Aggregate planning involves several key steps:

Forecasting demand: Predict future customer demand based on historical data, market trends, and other relevant factors.

Developing aggregate production plans: Determine the optimal level of production, taking into account factors such as workforce levels, inventory policies, subcontracting options, and overtime strategies.

Evaluating alternative plans: Compare different scenarios and adjust production plans to meet strategic objectives while considering cost, capacity, and other constraints.

Implementing the plan: Execute the chosen production plan, including scheduling production runs, allocating resources, and monitoring performance.

Feedback and control: Continuously monitor actual performance against the plan, identify deviations, and take corrective actions as needed to ensure that goals are met.

Common techniques used in aggregate planning include:

Level production strategy: Maintaining a steady production rate over the planning horizon by building inventory during periods of low demand and using it to meet demand during peak periods.

Chase demand strategy: Adjusting production levels to match changes in demand, often through hiring and layoffs or subcontracting to meet fluctuations in customer orders.

Mixed strategy: Combining elements of both level production and chase demand strategies to balance inventory holding costs, labor costs, and customer service levels.

Overall, effective aggregate planning is crucial for organizations to achieve their strategic objectives by aligning production capabilities with customer demand while optimizing resources and minimizing costs.

Need for Aggregate Production planning

Aggregate production planning (APP) is essential for several reasons in the field of operations management:

- 1. Matching Supply with Demand:** One of the primary purposes of aggregate production planning is to align the organization's production capacity with expected demand. By forecasting demand and adjusting production levels accordingly, companies can avoid underutilizing resources during periods of low demand or facing stock outs during periods of high demand.
- 2. Resource Optimization:** Aggregate production planning helps in optimizing the utilization of various resources such as labor, machinery, and raw materials. By planning production activities in advance, companies can schedule workforce shifts, plan maintenance activities, and manage inventory levels effectively, thereby minimizing idle time and reducing costs.
- 3. Cost Reduction:** Effective aggregate production planning enables companies to minimize costs associated with production, inventory holding, hiring, and overtime. By streamlining production processes and aligning them with demand patterns, companies can reduce unnecessary expenses and improve overall profitability.

- 4. Capacity Planning:** Aggregate production planning provides insights into the organization's capacity requirements over a specific period. This allows companies to make informed decisions regarding capacity expansions, equipment investments, and workforce management strategies to meet future demand effectively.
- 5. Improved Customer Service:** By ensuring a consistent level of production that matches customer demand, aggregate production planning helps in enhancing customer satisfaction. Companies can fulfill customer orders on time, reduce lead times, and improve overall service levels, thereby gaining a competitive edge in the market.
- 6. Strategic Alignment:** Aggregate production planning plays a crucial role in aligning operational activities with the company's strategic objectives. It enables organizations to prioritize production goals, allocate resources efficiently, and respond effectively to changes in market conditions or business priorities.
- 7. Risk Management:** By developing alternative production plans and considering various scenarios, aggregate production planning helps companies in mitigating risks associated with demand fluctuations, supply chain disruptions, or other unforeseen events. This allows organizations to maintain operational stability and resilience in the face of uncertainty.

Factors Affecting Aggregate Planning

Following factors are critical before an aggregate planning process can actually start;

- A complete information is required about available production facility and raw materials.
- A solid demand forecast covering the medium-range period
- Financial planning surrounding the production cost which includes raw material, labor, inventory planning, etc.
- Organization policy around labor management, quality management, etc.

Aggregate planning as an Operational Tool

Aggregate planning helps achieve balance between operation goal, financial goal and overall strategic objective of the organization. It serves as a platform to manage capacity and demand planning.

In a scenario where demand is not matching the capacity, an organization can try to balance both by pricing, promotion, order management and new demand creation.

In scenario where capacity is not matching demand, an organization can try to balance the both by various alternatives such as.

1. Laying off/hiring excess/inadequate excess/inadequate excess/inadequate workforce until demand decrease/increase. Including overtime as part of scheduling thereby creating additional capacity.
2. Hiring a temporary workforce for a fix period or outsourcing activity to a sub-contractor.

Capacity Adjustment

Capacity adjustment in operations management refers to the process of modifying a company's production capacity in response to changes in demand, market conditions, or internal factors. Capacity adjustment is crucial for maintaining operational efficiency, meeting customer demand, and optimizing resource utilization. There are several strategies and techniques for capacity adjustment, including:

Changing Workforce Levels: Adjusting the size of the workforce by hiring or laying off employees based on changes in demand forecasts. This strategy is often used in industries with variable demand patterns, such as retail or hospitality.

Overtime and Temporary Labor: Increasing capacity temporarily by offering overtime to existing employees or hiring temporary workers during peak demand periods. This approach helps to meet short-term increases in demand without incurring the costs associated with hiring and training new employees.

Subcontracting and Outsourcing: Outsourcing part of the production process to third-party suppliers or subcontractors to increase capacity quickly and cost-effectively. This strategy is common in industries where certain components or processes can be easily outsourced, such as manufacturing or IT services.

Inventory Management: Building up inventory during periods of low demand to buffer against fluctuations and meet increased demand without immediately adjusting production capacity. This approach requires careful inventory planning and management to balance holding costs and service levels.

Flexible Manufacturing Systems (FMS): Implementing flexible manufacturing technologies and processes that allow for rapid adjustment of production capacity and product mix. FMS systems use automation and computer-controlled equipment to adapt production schedules and configurations quickly.

Expansion or Contraction of Facilities: Investing in new facilities, equipment, or production lines to increase capacity in the long term, or consolidating operations and reducing capacity through facility closures or downsizing during periods of low demand.

Strategic Alliances and Partnerships: Collaborating with other companies or forming strategic alliances to share resources, production facilities, or expertise to adjust capacity more efficiently and cost-effectively.

Demand Management: Influencing demand patterns through pricing strategies, promotions, lead time adjustments, or product/service differentiation to align demand with existing capacity or facilitate smoother capacity adjustments.

Technology Adoption: Embracing new technologies such as automation, robotics, and artificial intelligence to improve operational efficiency, reduce labor requirements, and enhance flexibility in adjusting capacity.

Overall, capacity adjustment strategies should be aligned with the company's overall business objectives, market dynamics, and operational capabilities to ensure optimal performance and competitiveness in the marketplace. Effective capacity adjustment enables companies to adapt to changing demand conditions, minimize costs, and maintain high levels of customer satisfaction.

Basic strategies

In operations management, there are several basic strategies that organizations use to improve efficiency, productivity, and overall performance. These strategies aim to optimize processes, resources, and workflows to achieve strategic objectives. Here are some of the fundamental strategies in operations management:

Lean Manufacturing/Lean Operations: Lean principles focus on minimizing waste and maximizing value-added activities in production processes. Key principles include identifying and eliminating non-value-added activities (waste), improving flow and efficiency, empowering employees, and continuously improving processes through methods like Kaizen.

Just-in-Time (JIT) Production: JIT is a strategy aimed at reducing inventory levels and carrying costs by synchronizing production with customer demand. It involves producing goods or services only when needed, thereby minimizing inventory holding costs and improving cash flow.

Total Quality Management (TQM): TQM is a management approach that emphasizes continuous improvement of product and service quality through the involvement of all employees across the organization. TQM principles include customer focus, process improvement, employee empowerment, and fact-based decision-making.

Six Sigma: Six Sigma is a data-driven methodology aimed at reducing defects and variation in processes to achieve near-perfect quality. It involves defining, measuring, analyzing, improving, and controlling processes to systematically identify and eliminate defects and improve efficiency.

Supply Chain Management (SCM): SCM involves the coordination and integration of various activities involved in sourcing, production, and distribution to optimize the flow of goods and services from raw materials to end customers. Key aspects include supplier relationship management, inventory management, demand forecasting, and logistics optimization.

Theory of Constraints (TOC): TOC is a management philosophy that focuses on identifying and managing the constraints (bottlenecks) that limit an organization's

ability to achieve its goals. It involves identifying the most significant constraints, exploiting them to maximize throughput, subordinating non-constraints, and elevating constraints through improvements.

Capacity Planning and Management: Capacity planning involves aligning an organization's production or service delivery capabilities with customer demand. It includes assessing current capacity, forecasting future demand, adjusting capacity through strategies like hiring, outsourcing, or facility expansion, and optimizing resource utilization.

Continuous Improvement (CI): CI involves making incremental improvements to processes, products, or services over time to achieve better results. It relies on employee involvement, data-driven decision-making, and a culture of innovation and learning.

Agile Operations: Agile operations involve flexible and responsive approaches to managing operations, especially in dynamic and uncertain environments. It emphasizes adaptability, rapid iteration, collaboration, and customer feedback to deliver value efficiently.

Customer Relationship Management (CRM): CRM focuses on managing interactions with customers throughout the entire customer lifecycle to improve customer satisfaction, loyalty, and retention. It involves understanding customer needs, preferences, and behaviors to tailor products and services accordingly.

These strategies can be applied individually or in combination, depending on the specific goals, challenges, and context of an organization. By adopting and effectively implementing these strategies, organizations can improve their operational efficiency, reduce costs, enhance quality, and gain a competitive advantage in the marketplace

Level and chase strategies

Level and chase strategies are two common approaches used in aggregate production planning, a key component of operations management. These strategies help organizations manage their production capacity in response to fluctuating demand. Let's delve into each strategy:

I. Level Strategy:

In a level strategy, the organization maintains a constant production rate over the planning period, regardless of fluctuations in demand. Instead of adjusting production levels to match changes in demand, the organization uses inventory as a buffer to absorb fluctuations. This category of aggregate planning is concerned with making goods in similar quantities over an equal time period. This is done to deal with a surge in market demand by filling back orders or sending excess products to inventory.

The level strategy is a traditional aggregate planning method that continues to maintain a consistent rate of production as well as workforce level by maintaining consistent human resources and production in the organization.

It is best suited where inventory carrying costs are low and is mostly used by manufacturing companies. The benefits of using a level strategy include a well-trained workforce with fewer changes, experienced workers, and a low rate of absenteeism and employee turnover.

One significant disadvantage of the level strategy is the accumulation of inventory costs during the lean period when demand is low.

- Production remains constant throughout the planning period.
- Excess production during periods of low demand is stored as inventory.
- Inventory levels are built up during periods of low demand and drawn down during periods of high demand.
- Workforce levels and other resources are generally stable, with minimal hiring or layoffs.

Advantages:

1. Smoother production levels lead to more stable workforce levels and reduced labor turnover.
2. Allows for economies of scale in production and potentially lower per-unit costs.
3. Minimizes the need for overtime or temporary labor.

Disadvantages:

1. Higher holding costs associated with maintaining inventory.
2. Risk of obsolescence or spoilage of stored inventory.
3. May lead to reduced flexibility in responding to sudden changes in demand.

II. Chase Strategy:

In a chase strategy, the organization adjusts its production levels to match changes in demand closely. Production is varied to meet the actual demand for products or services, with minimal reliance on inventory as a buffer. The chase strategy of

aggregate planning focuses on inventory reduction. It adjusts to changes in demand by changing either the real level of output or the workforce size.

It is regarded as less rigid than a level strategy because it allows for certain deviation from the conventional approach. By receiving goods only when they are needed, this methodology helps to reduce waste. Employees are frequently stressed as a result.

This strategy is widely used in a variety of industries, including hospitals, hospitality businesses, and educational institutions such as schools. The benefit of the chase strategy is its high flexibility to meet fluctuations in demand, while the disadvantages include high costs associated with hiring and training the workforce.

- Production levels fluctuate in response to changes in demand.
- Workforce levels are adjusted through hiring or layoffs to match production requirements.
- Minimal reliance on inventory; production is typically aligned with immediate demand.
- Higher utilization of resources during periods of high demand.

Advantages:

1. Minimizes inventory holding costs.
2. Ensures efficient utilization of resources, particularly during peak demand periods.
3. Provides greater flexibility to respond to changes in demand.

Disadvantages:

1. Increased labor turnover due to frequent hiring and layoffs.
2. Higher costs associated with hiring, training, and severance.
3. Potential for reduced economies of scale and higher per-unit costs due to fluctuating production levels.
4. Both strategies have their own set of advantages and disadvantages, and the choice between them depends on factors such as the nature of demand, production capabilities, inventory holding costs, and the organizations overall objectives and priorities. Additionally, hybrid strategies that combine elements of both level and chase strategies are also common, allowing organizations to balance stability and flexibility in their production planning.