



Aggregate Planning

- I. Introduction
 - a. Business units: Long-term strategy planning
 - b. Short-term: Workforce, equipment, customer scheduling
 - c. Manufacturing: Intermediate: Material orders, ... (no comparison with the service industries). This is aggregate planning
 - d. Need an estimate of sales over the horizon
 - e. Of course, we care here only about aggregate planning with respect to operations, but marketing and others will also need their own plans
 - f. The goal is to match supply and demand
 - g. Should be demand management planning (for sales)
 - i. What affects demand that managers can control?
 - ii. Pricing
 - iii. Can manufacture complementary products: lawn mowers and snow blowers. Similar manufacturing needs but complementary seasonality
 - iv. Advertising / promotion
 - v. Reservations and backlogs
 - 1. Make reservations for hotel / dinner / hospital
 - 2. Backlogs occur in a service situation
 - 3. Can reduce the backlog at a grocery store by opening new checkout lanes
 - h. Should also manage supply (operations)
 - i. Managers have more control here
 - ii. What can management do to control supply?
 - iii. Control overtime and under-time
 - iv. Hiring and firing
 - v. Temporary / part-time laborers
 - vi. Subcontracting
 - vii. Control Back orders / backlogs, stock-outs
 - i. Supply Management Objectives
 - i. Plan the overall levels for output / capacity
 - ii. Obviously minimize costs / maximize efficiency
 - iii. How to meet these objectives?
 - 1. Get optimal combination of...
 - 2. Production Rate (units completed / unit time)
 - 3. Workforce Level (more important in lower-capital situations)
 - 4. Inventory on Hand: Back order / backlog is negative inventory
 - j. Considerations
 - i. This planning shouldn't be detailed by individual products / models. May plan by product line.
 - ii. Where the resources needed to produce X are different from what's needed to produce Y, it doesn't make sense to plan in terms of units
 - iii. May use dollars or "tons of steel" or some other common denominator
 - iv. This is intermediate planning – roughly 6 – 18 months out.
 - v. Linking the aggregate operations plan to the financial plan obviously requires more than twelve months ahead
 - k. Demand-Meeting Strategies
 - i. "Chase Demand Strategy" – Constantly adjust production based on the most recent demand
 - ii. "Level Capacity Strategy" – Produce the same amount regardless of demand
 - iii. You want to be somewhere in the middle of those two extremes
- II. Linear Programming
 - a. What is it?
 - i. A mathematical procedure for deciding how to allocate scarce resources best.

- ii. This is something the computer would presumably do for you
- b. Mathematical Model
 - i. Objective: Maximize the sum of $c_i X_i$ for some range of i 's
 - ii. X_i – Variables
 - 1. Money to spend on advertising
 - 2. Units of product P produced
 - iii. Limitations
 - 1. Sum of $a_{1i} X_i \leq b_1$
 - 2. Sum $a_{2i} X_i \geq b_2$
 - 3. et cetera
 - 4. Sometimes have direct constraints on individual variables; sometimes on combinations
 - iv. Assumptions
 - 1. Proportionality: Double the activity level, double, say, the profit line. Cut activity in half, cut level of resources in half.
 - 2. Additivity: There are no interrelationships between variables. Profit from A plus profit from B is the total profit (no cannibalization, like in [BSAD-150]).
 - 3. Divisibility: Can get decimal values as results; may not apply perfectly to the real scenario. You can't hire 13.61 people, for example