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Production Planning & Control

Stages and time horizons of operations planning

v1. Spring 2021

From Product Design To Production Planning

Product Design

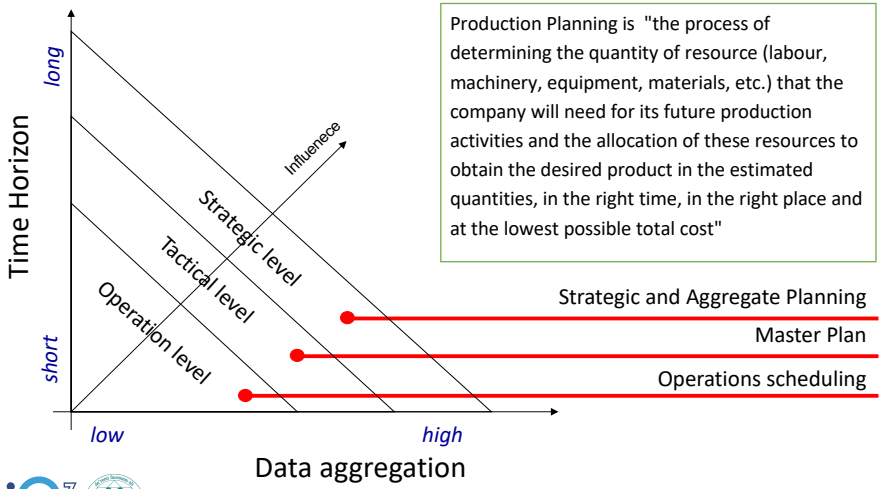
Process Design

Market analysis and Demand Forecasting

Production Planning

The goal is
- *to allocate resources*
  (plant capacity, human and financial resources)
- *effectively and efficiently*
- *in a given time horizon*

Production Planning

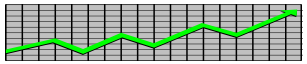
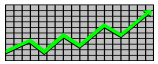


Production Planning is "the process of determining the quantity of resource (labour, machinery, equipment, materials, etc.) that the company will need for its future production activities and the allocation of these resources to obtain the desired product in the estimated quantities, in the right time, in the right place and at the lowest possible total cost"

Product Aggregation

- ITEM product or end item to satisfy customer demand
- FAMILY set of products with similar features
- TYPE group of families with similar production costs

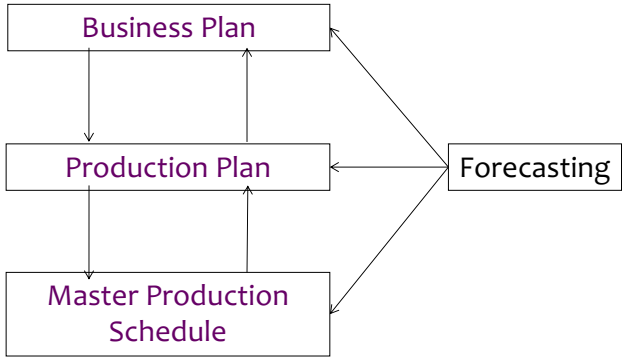
Planning Horizons

Plan	Focus on	Time Horizon
STRATEGIC	**new product, new process or plant**	**3-5 years** 
AGGREGATE	**Production capacity, procurement**	**1 year** 
MASTER	**What, when and how much produce**	**2-6 months**

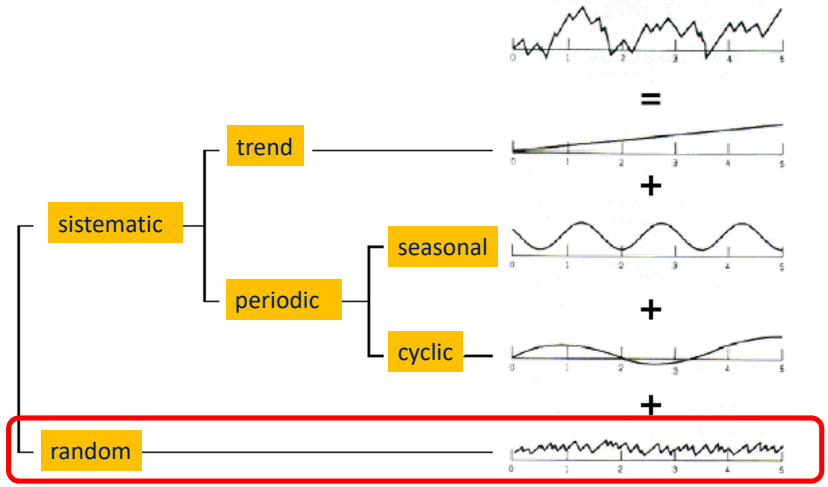
Planning Tools

PLAN		UNIT	RESOURCE CAPACITY	TIME INTERVAL
Strategic	Business Plan	Financial	Plant	Quater
Aggregate	Production Plan	Quantity (family)	Plant/Line	Month
Master	Master Schedule	Quantity (product)	Work Centre	Week

Planning and Demand Forecasting



Demand Forecasting: components



Demand Forecasting: features

Forecasts are by definition incorrect: although evident, very often once made, they tend to be assumed to be unchangeable

A correct forecast always provides a range of validity: a valid and effective forecast must indicate the error inherent in it

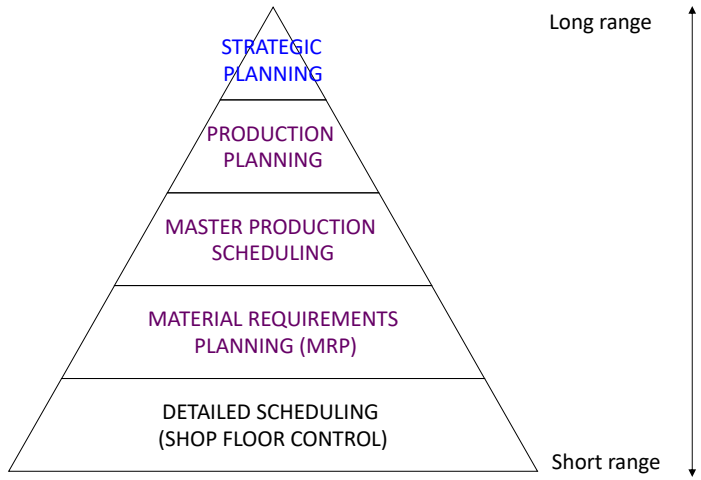
A correct forecast analyzes all available information: under dynamic environmental conditions, the influence of changes must be considered, and the forecast itself must be dynamic

The validity of the forecast depends on the degree of aggregation: attempting to achieve excessive levels of detail is punished by the laws of probability

The validity of the forecast depends on the time horizon: with the same aggregation, predictions made over long time horizons have higher levels of uncertainty

Dunn's law: *no amount of planning, no matter how careful, can ever be as effective as a stroke of luck ;-)*

Production Planning & Control: Levels



Strategic Planning

Long Range Planning

Long Range Planning (Strategic)

- Time horizon: one or more years (3-5)
- Objective: to formulate a production budget (product families, turnover) for each Production Unit PU (line, factory)
- Through strategic decisions relating to
  - Evaluation of available resources
  - Adaptation/creation of production capacity
  - Make or Buy, purchase/sale of production capacity
  - Allocation of the workforce to Production Units
- Tools:
  - Economic and market assessments
  - Plant potentiality

Exercise 1

Production assessment: Make or Buy

	Item A	Item B	Item C
Demand (u)	4000	700	12000
Total cost of raw materials (€)	600	10000	9000
Direct Labour (h)	200	1500	2000
Purchase prize(€/u)	0,8	50	2

Direct labour Cost (€/h)	8
Overhead cost per hour of direct work (€/h)	6

Exercise 2

Technological Options and Production Rate Assessment

	Process A	Process B
Variable Costs (€/u)	20	50
Fixed Costs (k€)	500	200

a. Which is the production rate that makes a process preferable to the other?

b. Choose the process knowing that unit prices vary with quantities:

q (u)	p (€/u)
<= 5000	120
<= 20000	100
> 20000	80

2 approaches:
1. all units discount
2. incremental discount