Product and Production Planning

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Product Planning and Development

Subchapter 1

Definition of a Product

Product could be defined as *anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a want or a need* (Phillip Kotler)

Physical	Person	Place	Organization	Idea	Services
					
					

Product Scope - Three Aspects

1. Physical Aspect

- What it is ? E.g. It is a herbal tooth paste

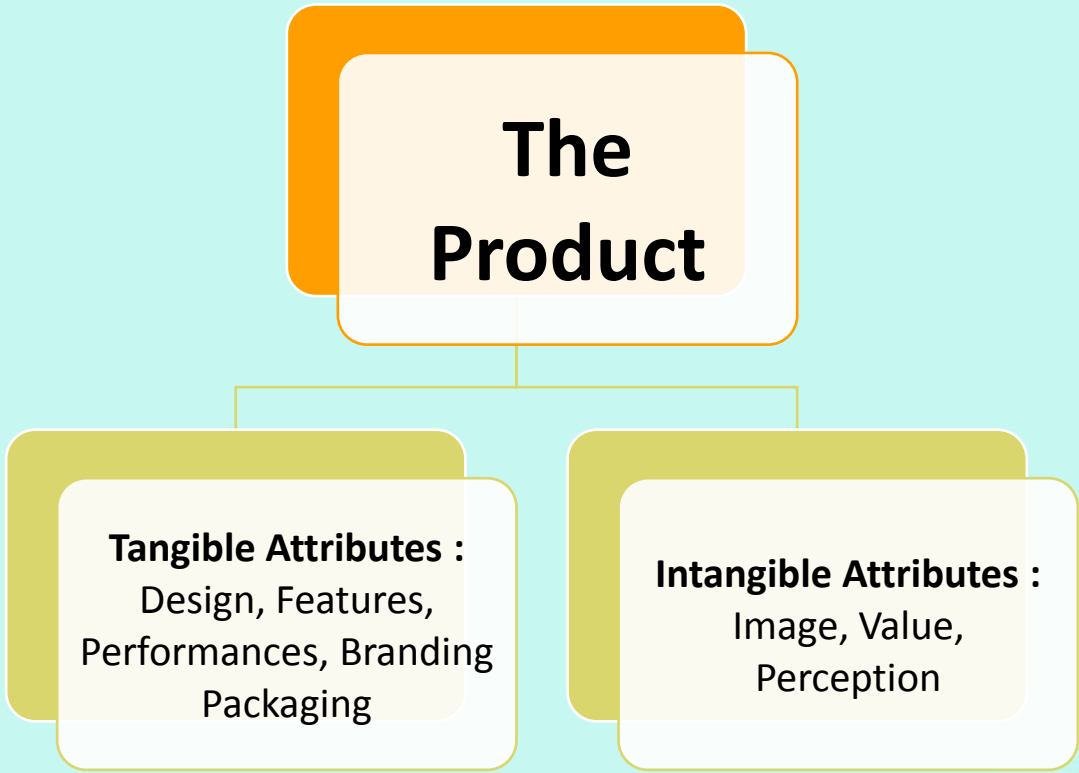
2. Functional Aspect

- What it does? E.g. It cleans tooth/ prevents tooth decay

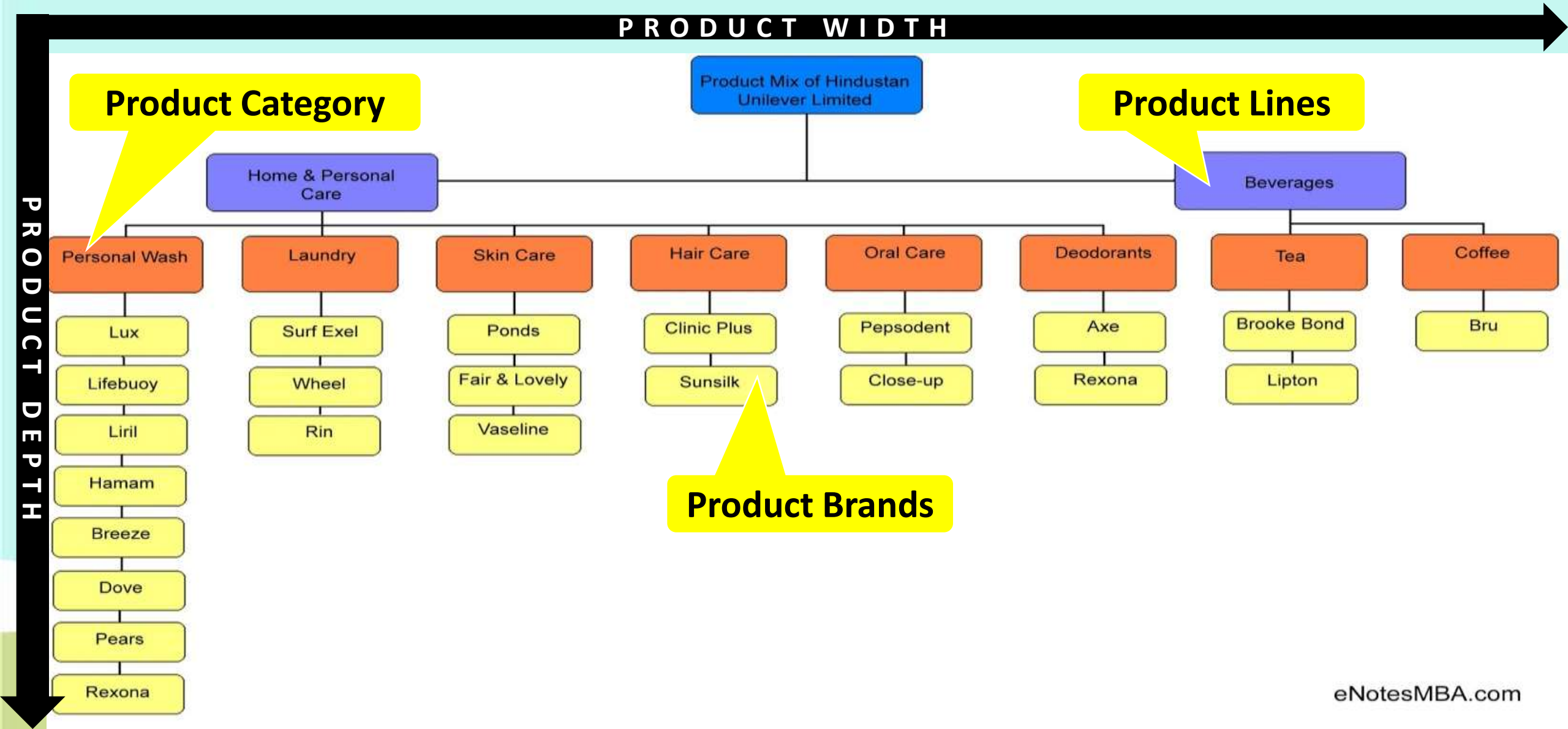
3. Symbolic Aspect

- What it means to the users emotion? E.g. The satisfaction of a person “free from tooth decay”

The Product Attributes

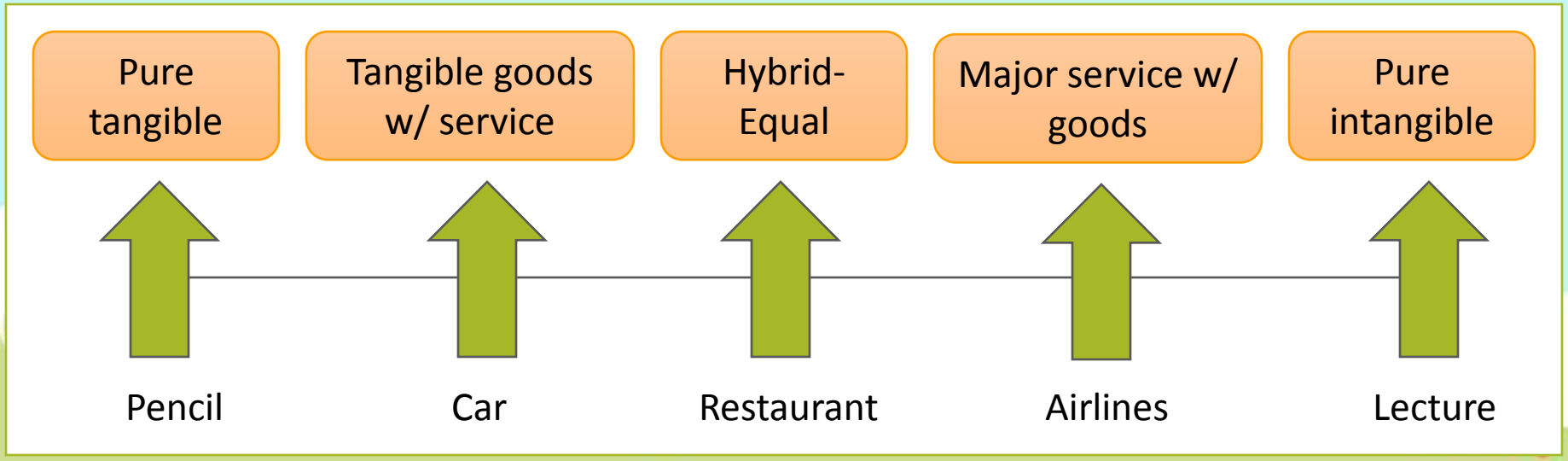


Product Mix Strategy



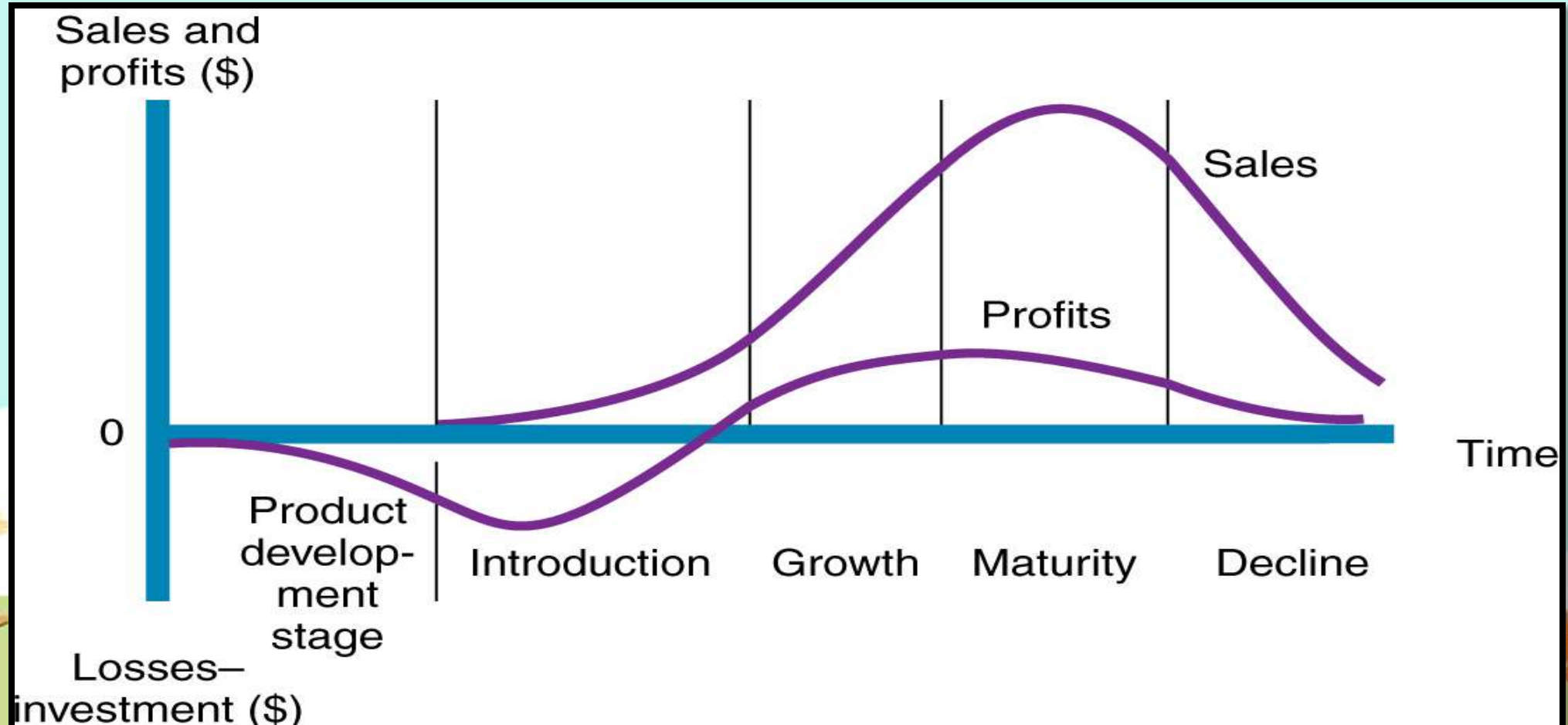
Tangibility Continuum of a Products

- Tangibility continuum discuss about to a what degree a product is tangible or intangible.
- It is practically difficult to find a totally tangible product or a totally intangible product in the modern world of marketing
- In many products there are physical goods as well as service components.

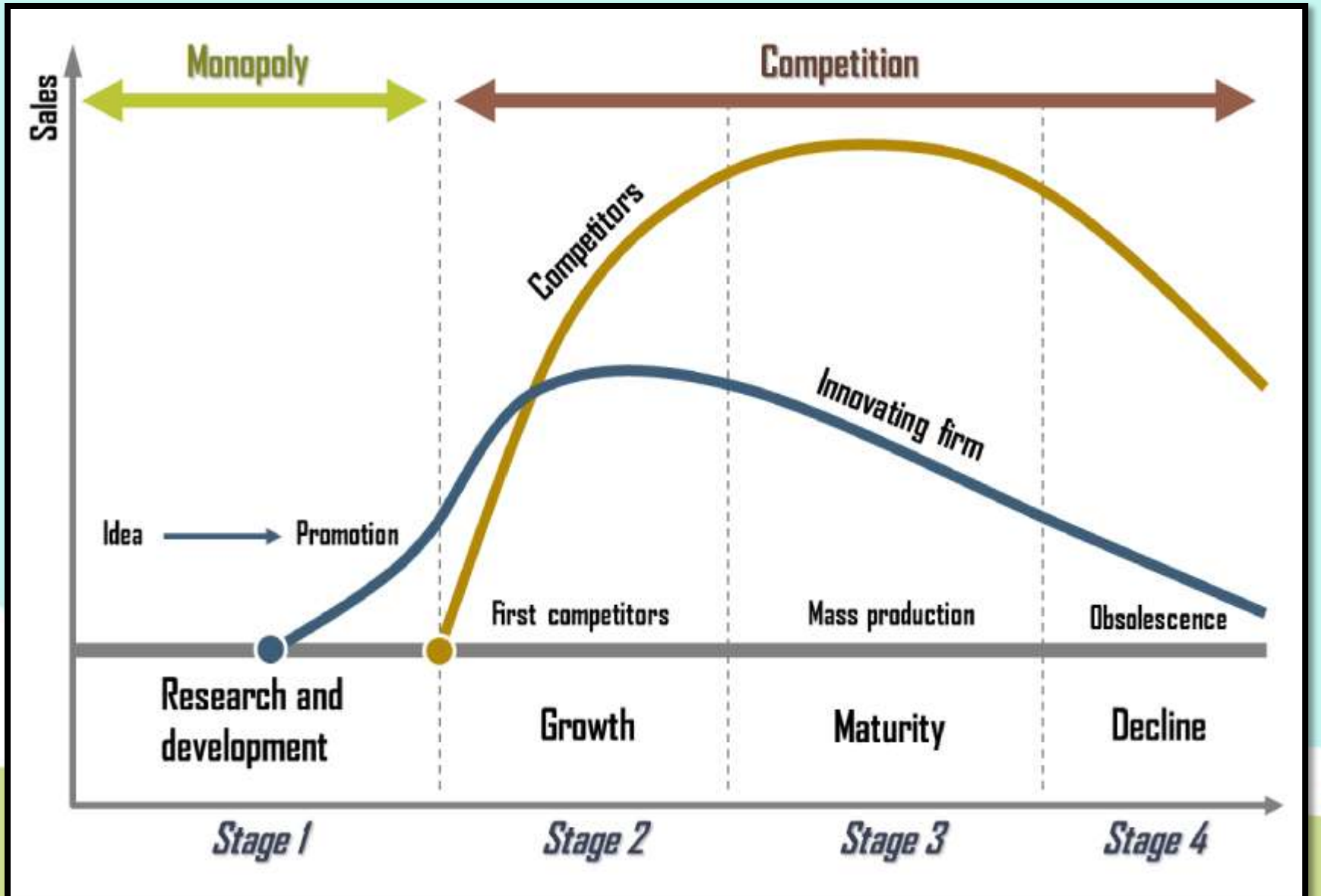


Product Life Cycle (PLC) Theory

- It is assumed that a product will have a life cycle from development to decline.
- It is measured in relation to time and sales.
- However every product may not go through the same life cycle or some products will stay for along without getting on to the declining stage.



Stages of Product Life Cycle



Comparisons Each Stages of PLC

Introductory	Growth	Maturity	Declining
Relatively short	Relatively short	Longer period	Longer or short
Sales are usually slow and profits ar low	Sales increase and profits will be high	Sales growth become slow but volume big	Drop in the sales
Competitors will watch	New competitors enter	More competition and over capacity	Competitors do not enter due to low margings
Distribution has just begun	More distributors take up the product	Many distributors and undercutting	Distributors reduce or give up
Positioning and brand awareness	Brand image is established	Many brands fight each other	Brand image is low
Promotion budget very high	Promo budget may be increased	Promo budget may be standard or low	Not much promotions done
Only one or two manufacturers	Few manufacturers	Many manufactuers	Abandoning manufacturing
High Product failure rate	Improve product quality and features	Many changes in the Marketing mix to be done	May have to take a decision to stay on or not

PLC to the Marketers

Importance

- Important tool for forecasting and strategic planning
- It shows that product have a limited life span
- It graphically shows the trend in sales and profitability
- It shows the need to adopt different strategies in various stages

Limitations

- Many products may not have a life cycle as depicted by PLC
- Stages of PLC are difficult to distinguish
- Identifying where one stage ends and the other begins is very difficult
- Traditional shape may not occur, e.g. fad items
- Ignores the application of marketing mix activities
- Strategic decisions can change the PLC e.g.. repositioning

Planning for New Products

- Long term survival of many firms in the competitive world depends on launching new products successfully.
- Planning for new products is an essential and demanding strategic activity.
- There could be many types of new products

Reasons introducing new products :

- To suit the changes in customers needs
- To adopt new technological advances and avoid obsolesce
- To match competition
- Product Life Cycle Concept
- To bring down the cost

Types of New Products

Innovative Products

- These products are new to the world and new to the company.
- They are truly new to the customers and they provide completely different alternatives to existing products
- Example : vaccine for AIDS

Replacement Products

- Although these products are new to customers or even to the company, they are essentially improvements or redesigns of existing products
- Example : digital phones replaced the analogues

Imitative Products

- These products are new to the company and not new to the market
- Many products come in this form to the market
- One or few companies may come out with an innovative or replacement products but many will copy the technology and come out with similar products. They are called me-too products
- Example : After Mercedes Benz > Ford > GM > Toyota > Nissan

Stages of New Product Development

1. Idea Generation
2. Idea Screening
3. Concept Development & testing
4. Marketing Strategy
5. Business Analysis
6. Product Development
7. Test Marketing
8. Commerciali-zation (Launch)

Production Planning and Inventory Control

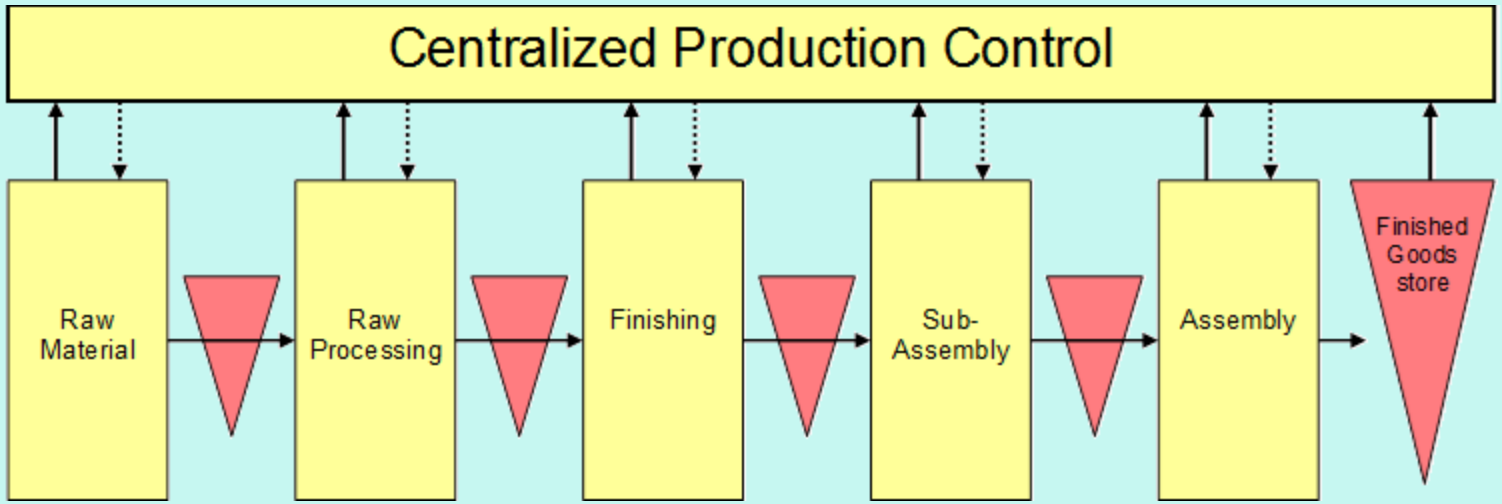
Subchapter 2

Production/ Manufacturing

Production/ manufacturing is the process of converting raw materials or semi-finished products into finished products that have value in the market place. This process involves the contribution of labor, equipment, energy, and information.

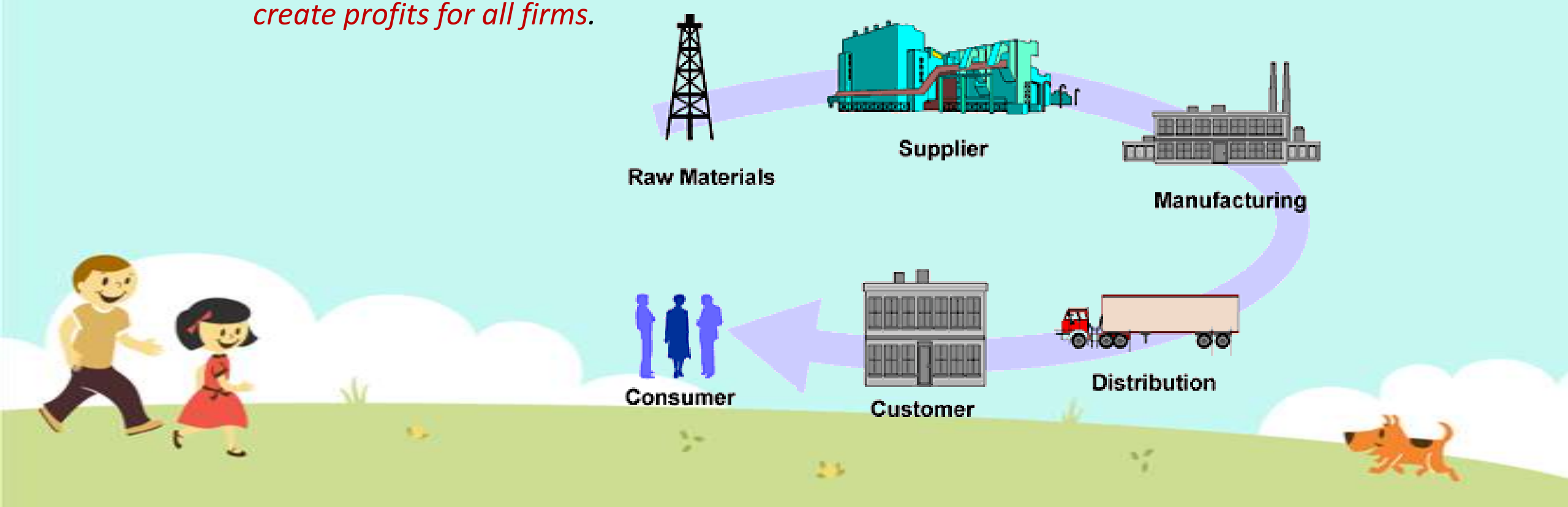
Inventory

- *Inventory is both an input and output of the production process.*
- *Inventory can be in the form of raw materials, semi-finished, and finished products.*



Supply Chain Management

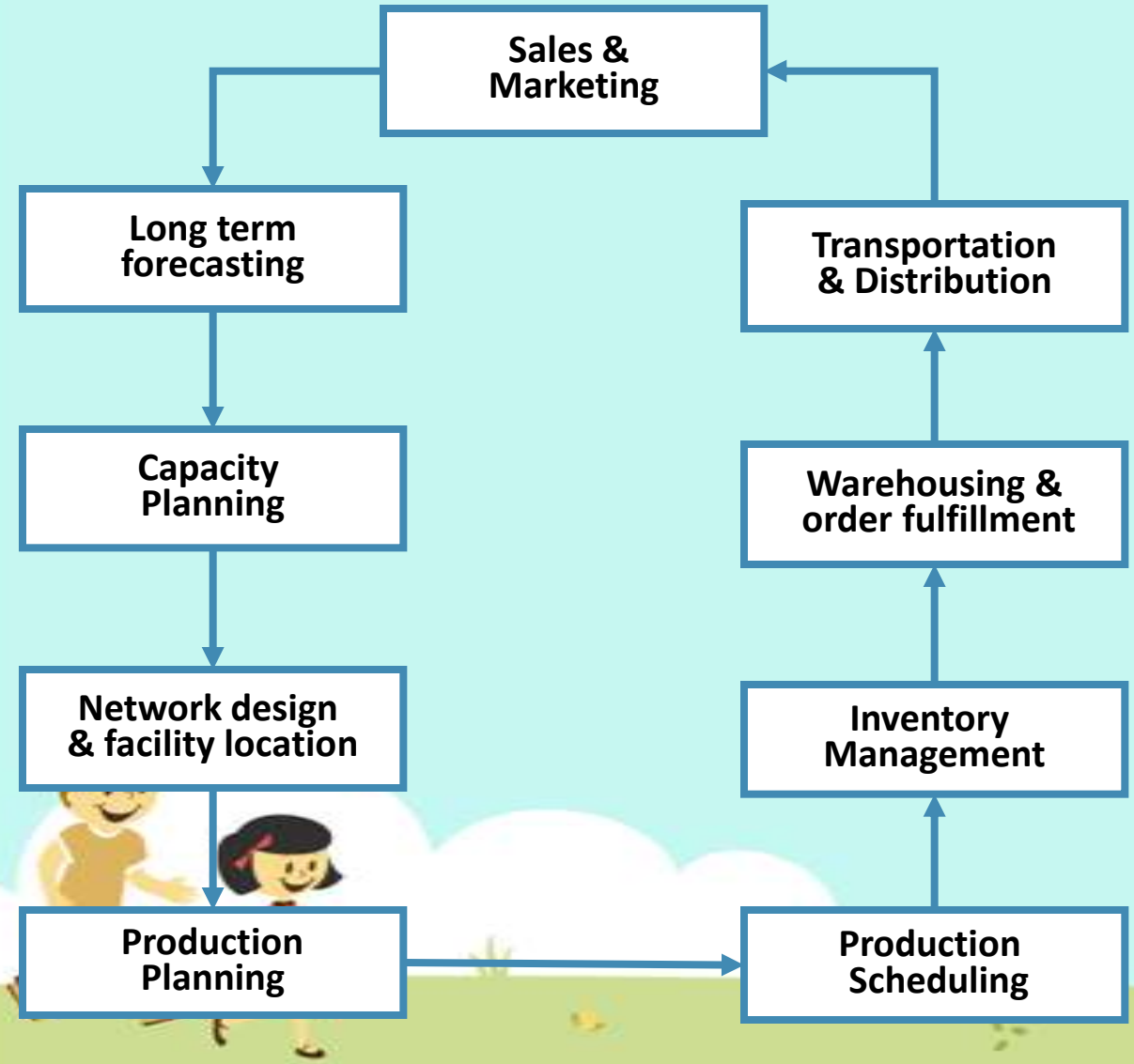
- *Supply Chain Management (SCM) is the set of functions concerned with the effective utilization of limited resources that may reside with one or more independent firms and the management of material, information, and financial flows within and between these firms, so as to satisfy customer demands and create profits for all firms.*



Production Planning and Inventory Control

- *Production planning and inventory control is the subset of SCM functions that focus on managing production operations and inventory throughout the supply chain.*

Hierarchy of Decisions



- What should we produce, how much, and when (forecasting)?
- How much can we produce (capacity planning)?
- How much do we have and how much do we need (inventory management)?
- When should we produce (production planning and scheduling)?

Performance Measures

Cost	Quality	Variety	Service
• Are products being created at minimum or acceptable cost?	• What are the specifications of the products? • What percentages of shipped products meet specification?	• How many types of products are - or can be – simultaneously produced?	• How long does it take to fulfill a customer order? • How often are quoted lead times met?

Flexibility	Worker satisfaction	Safety	Environmental impact
• How quickly can existing resources be reconfigured to produce new products?	• Are workers and managers throughout the supply chain happy and motivated?	• Are work environments safe for workers and the surrounding community?	• How environmentally friendly are the supply chain processes and the products?

Types of Production System

Mass Production

- Low product variety
- High production volumes
- Specialized labor
- Dedicated equipment
- High reconfiguration costs
- Make-to-stock production

Batch Production

- Medium product variety
- Products are made in larger lots
- products are made to stock
- Programmable/reconfigurable equipment
- Significant setup costs

Job Shops Production

- High product variety
- Products are made in small lots
- Products are made to order
- Flexible equipment and labor
- Small setups

Process Capabilities & Business Strategy

- A firm must choose a business strategy - attribute values for its portfolio of products - that differentiates it from the competition.
  - Example product attributes : price, quality, variety, service, demand uncertainty
- A firm must choose process capabilities - attribute values for its process - that support its business strategy.
  - Example process attributes : cost, quality, flexibility, lead time
- A business strategy can be driven by market opportunities or by a competitive advantage in process capabilities.
- In both cases, there must be a fit between process capability and business strategy.

The Evolution of Process Capabilities

Cost | Quality | Delivery | Flexibility/ Responsiveness | Innovation

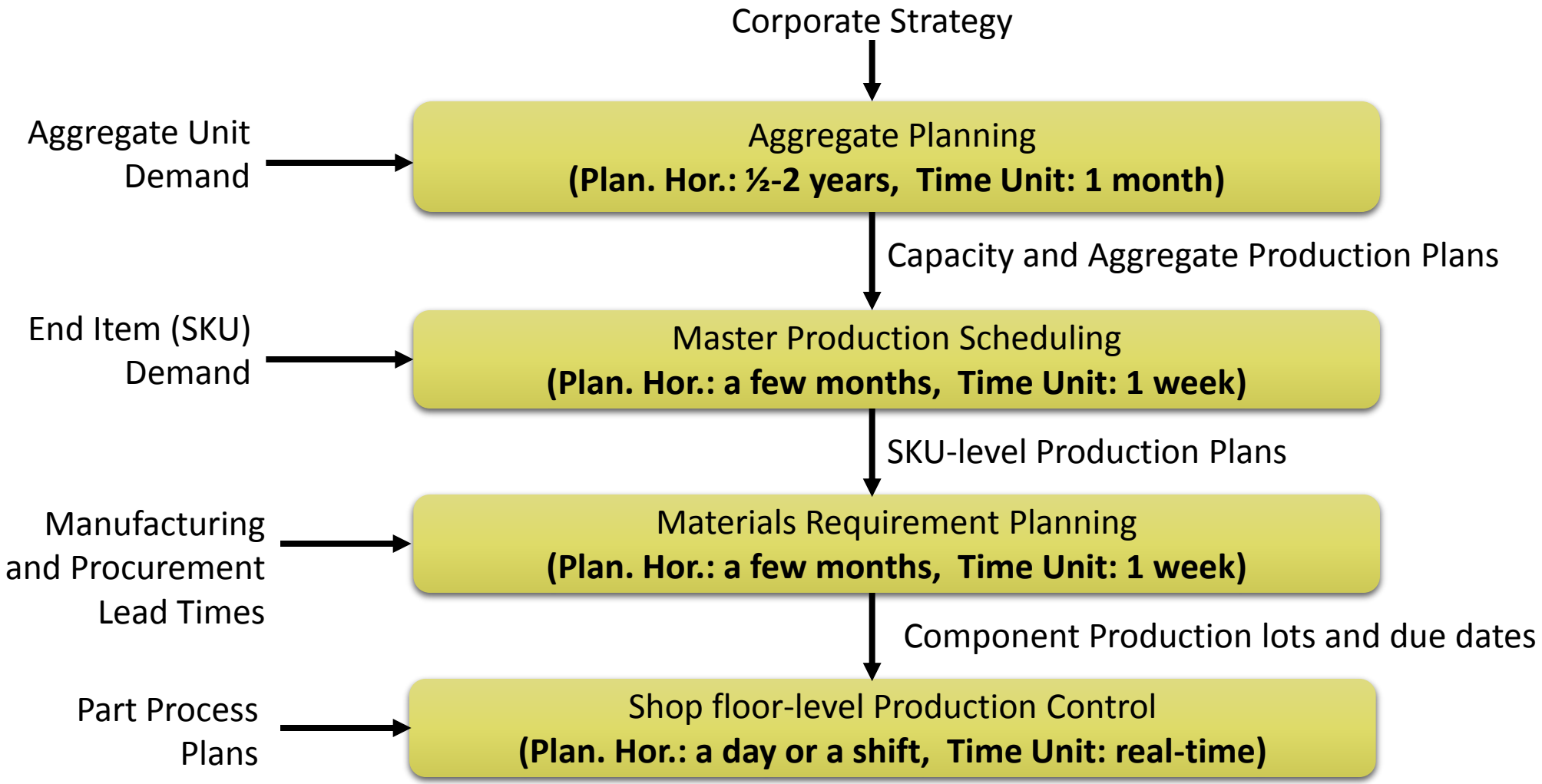
1800 | 1960 | 1970 | 1980 | 1990 | 2000

Hemat energi ???
Environmental friendly???

Purpose and Main Function of PPIC

- Effectively utilize limited resources in the production of goods so as to satisfy customer demands and create a profit for investors.
  - ***Resources*** include the production facilities, labor and materials.
  - ***Constraints*** include the availability of resources, delivery times for the products, and management policies.
- Main Functions of PPIC :
  - ***Forecasting*** to predict customer demand on various products over a given horizon.
  - ***Aggregate Planning*** to determine overall resources needed.
  - ***Materials Requirement Planning*** to determine all required components and timing.
  - ***Inventory Management*** to decide production or purchase quantities and timing.
  - ***Scheduling*** to determine shop-floor schedule of various components.

Production Planning through Time-based Decomposition

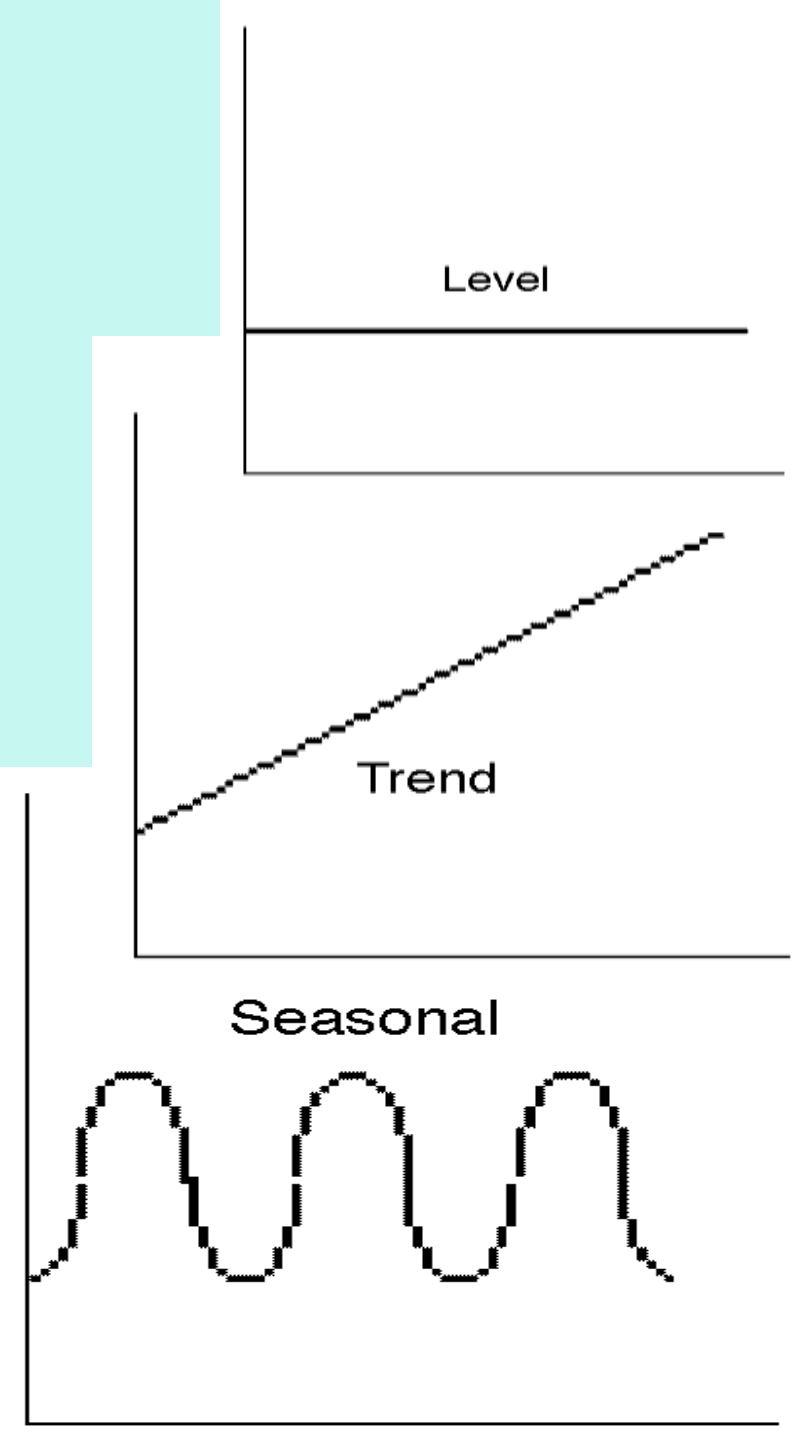


Production System Decision Hierarchy

Inputs	Process	Outputs	Length of Planning Horizon
• Long Range Economic Forecasts • Financial Choices	Strategic Planning	• Operating Facilities • Product Line (Families) • Technologies	Years
• Processing Technologies/Efficiency • Medium Range Product • Family Forecasts • Machine Schedules	Aggregate Production Planning	• Production Level • Workforce Level • Family Inventories	Months
• Production Levels • Workforce Levels • Current Inventory Status • Changeover Times and Costs • Item Forecasts	Disaggregation	• Master Production Schedule (MPS) - Final Assembly by item • Item Inventories	Weeks
• MPS • Bill of Materials • Process Plans	Production Scheduling	• Job Priorities • Order Releases • Machine Schedules	Days-Shift
• Labor Status • Machine Status • Job Priorities • Order Releases • Machine Schedules	Shop Floor Control	• Machine Priorities • Job Status • Labor Reporting • Material Handling Tasks • Load/Prices/Unload Authorization	Real Time – Minutes

Forecasting

- Objective: ***predict demand for planning purposes.***
- Laws of Forecasting:
  1. ***Forecasts are always wrong!***
  2. ***Forecasts always change!***
  3. ***The further into the future, the less reliable the forecast will be!***
- Forecasting Tools:
  - ***Qualitative***: Delphi, Analogies
  - ***Quantitative***: Causal and time series models



Aggregate Planning

- Objective: ***generate a long-term production plan that establishes a rough product mix, anticipates bottlenecks, and is consistent with capacity and workforce plans.***
- Issues:
  - ***Aggregation***: product families and time periods must be set appropriately for the environment.
  - ***Coordination***: AP is the link between the high level functions of forecasting/capacity planning and intermediate level functions of MRP, inventory control, and scheduling.
  - ***Anticipating Execution***: AP is virtually always done deterministically, while production is carried out in a stochastic environment.

	January	February	March	April	May	June
Beginning inventory	400	450	375	274	225	275
Demand forecast	1800	1500	1100	900	1100	1600
Safety stock (0.25 × demand forecast)	450	375	275	225	275	400
Production requirement (demand forecast + safety stock – beginning inventory)	1850	1425	1000	850	1150	1725
Ending inventory (beginning inventory + production requirement – demand forecast)	450	375	275	225	275	400

Workforce Planning

- ***How much and what kind of labor is needed to support production goals?***
- Issues:
  - ***Basic Staffing Calculations***: standard labor hours adjusted for worker availability.
  - ***Working Environment***: stability, morale, learning.
  - ***Flexibility/Agility***: ability of workforce to support plant's ability to respond to short and long term shifts.
  - ***Quality***: procedures are only as good as the people who carry them out.

Capacity / Facility Planning

- **How much and what kind of physical equipment is needed to support production goals?**
- Issues:
  - ***Basic Capacity Calculations***: stand-alone capacities and congestion effects (e.g., blocking)
  - ***Capacity Strategy***: lead or follow demand
  - ***Make-or-Buy***: vendor, long-term identity
  - ***Flexibility***: with regard to product, volume, mix
  - ***Speed***: scalability, learning curves

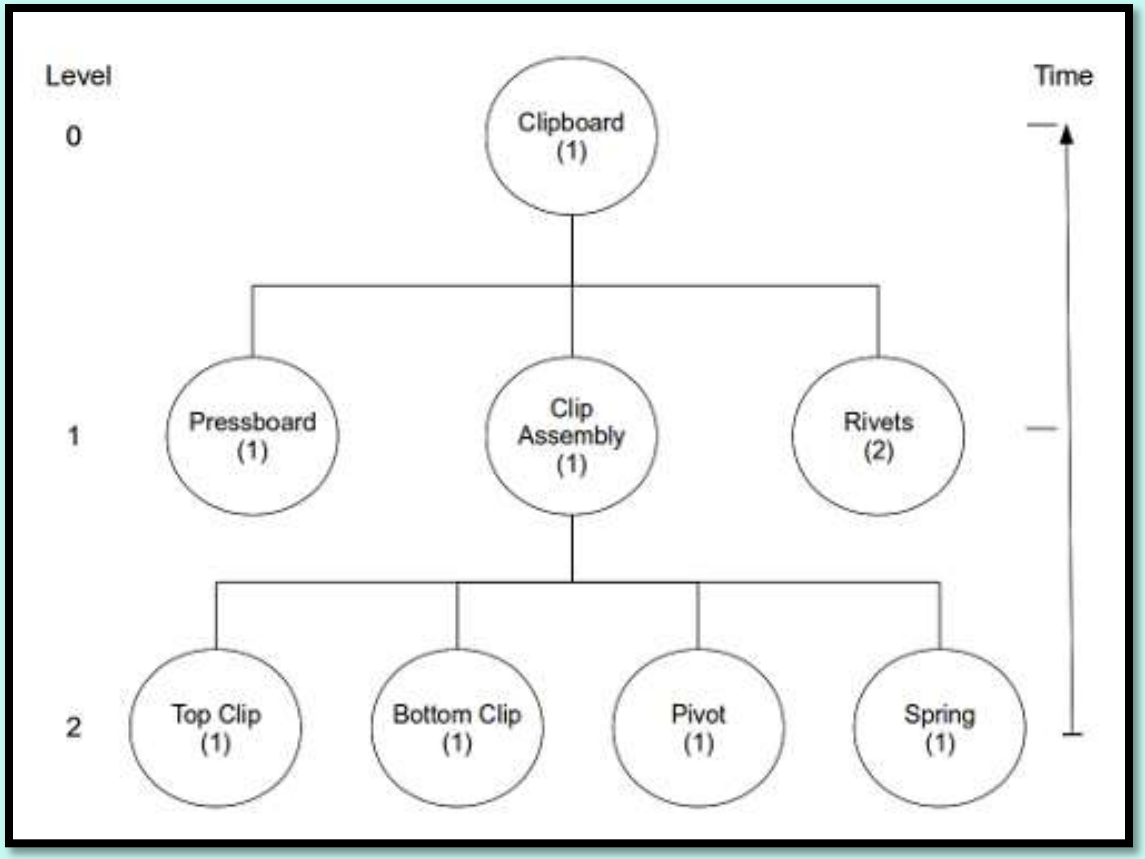
Demand Management

- Objective: ***establish an interface between the customer and the plant floor, that supports both competitive customer service and workable production schedules.***

- Issues:
  - ***Customer Lead Times***: shorter is more competitive.
  - ***Customer Service***: on-time delivery.
  - ***Batching***: grouping like product families can reduce lost capacity due to setups.
  - ***Interface with Scheduling***: customer due dates are an enormously important control in the overall scheduling process.

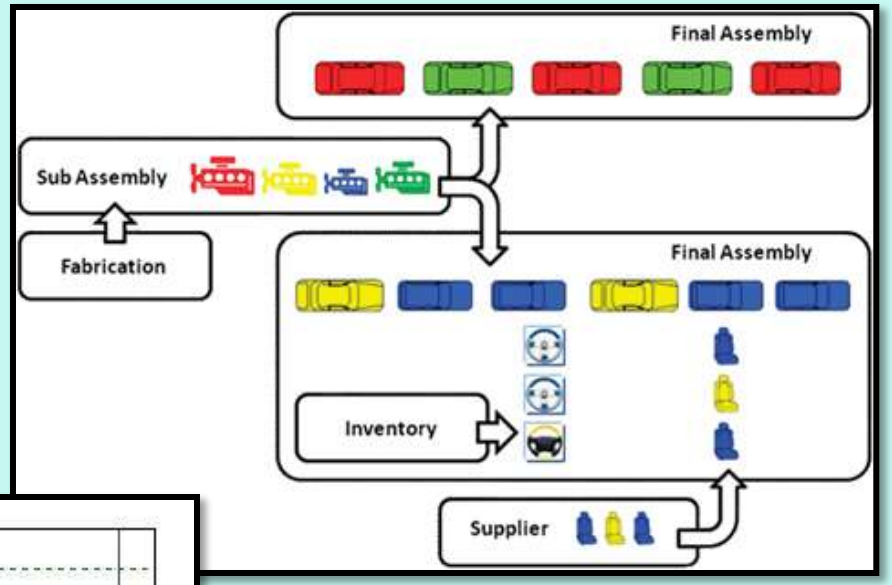
Material Requirement Planning

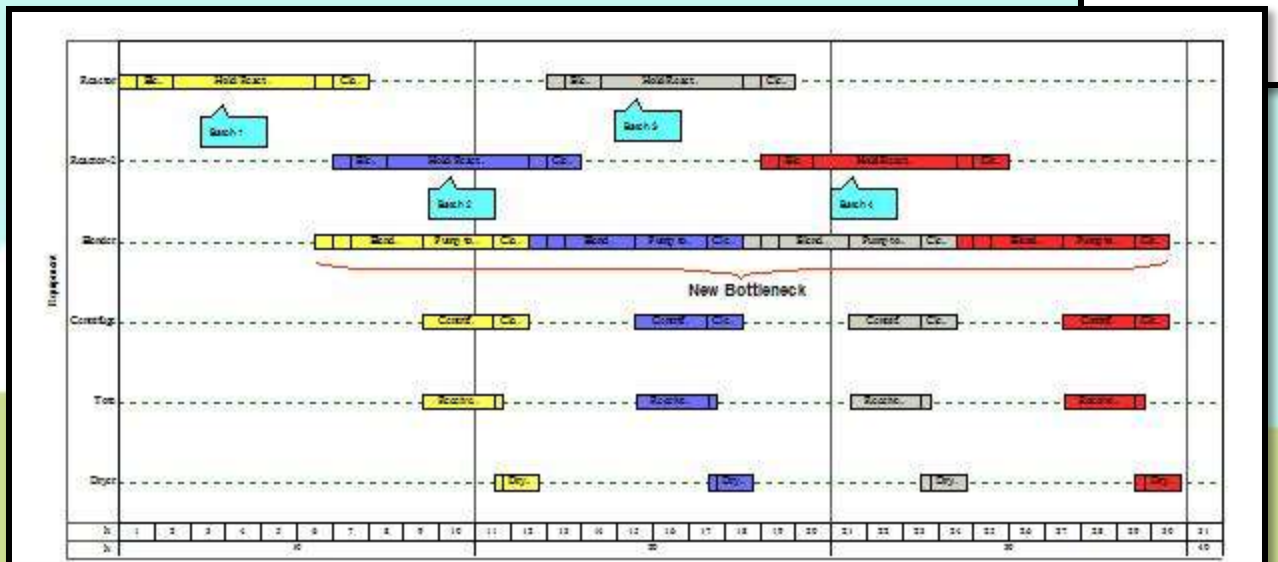
- Objective: ***Determine all purchase and production components needed to satisfy the aggregate/disaggregate plan.***
- Issues:
  - ***Bill of Materials (BOM) Tree*** : Determines components, quantities and lead times.
  - ***Inventory Management***: Must be coordinated with inventory.



Sequencing and Scheduling

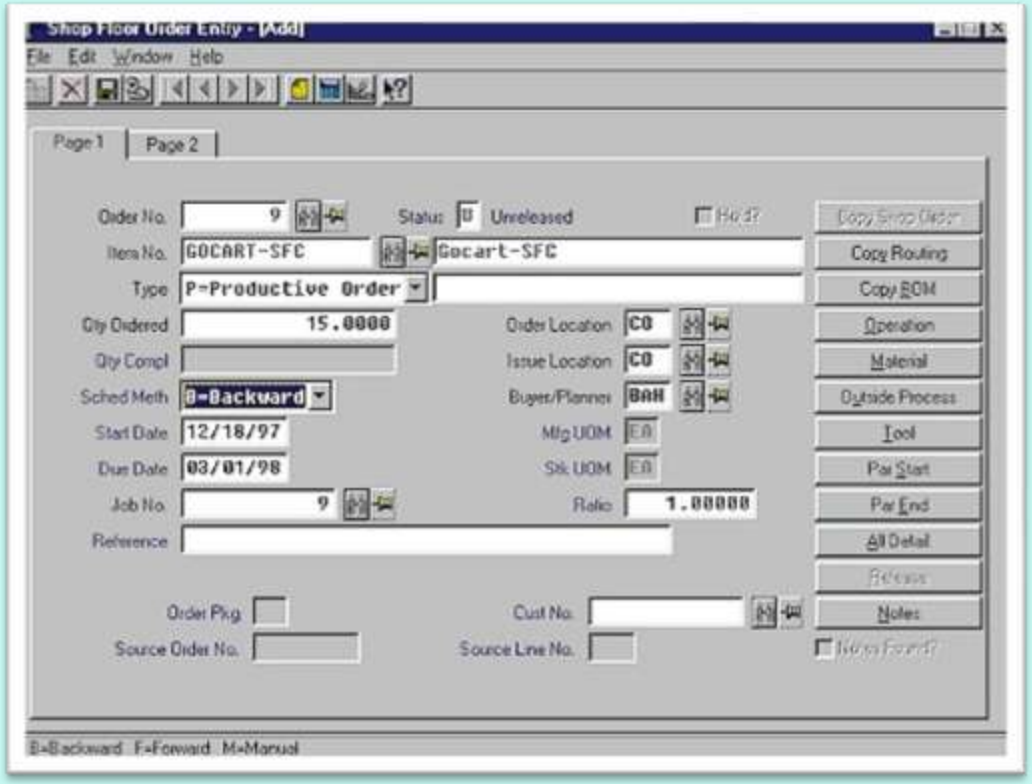
- Objective: **develop a plan to guide the release of work into the system and coordination with needed resources (e.g., machines, staffing, materials).**
- Methods:
  - ***Sequencing***: Gives order of releases but not times.
  - ***Scheduling***: Gives detailed release times.





Shop Floor Control

- Objective: ***control flow of work through plant and coordinate with other activities (e.g., quality control, preventive maintenance, etc.)***
- Issues:
  - ***Customization***: SFC is often the most highly customized activity in a plant.
  - ***Information Collection***: SFC represents the interface with the actual production processes and is therefore a good place to collect data.
  - ***Simplicity***: departures from simple mechanisms must be carefully justified.

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management
facilities
Entrepreneuership
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KEEP
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