BAHAN AJAR 2

LINGKUP DAN BIDANG ILMU YANG TERKAIT

FOOD SCIENCE AND TECHNOLOGY

FOOD CHEMISTRY

FOOD MICROBIOLOGY & FOOD SAFETY

FOOD ENGINEERING

FOOD PROCESSINGPLANT DESIGN

THE OBJECTIVE:

To economically produce food products, which are safe, nutritious, and organoleptically acceptable to the consumers

CHEMICAL PLANT DESIGN

Chemical Engineering

Mechanical engineering

Electrical engineering

Industrial engineering

Mostly homogenous gas and liquid → physical properties of materials are available and can be predicted

FOOD PLANT DESIGN

Chemical Engineering

Mechanical engineering

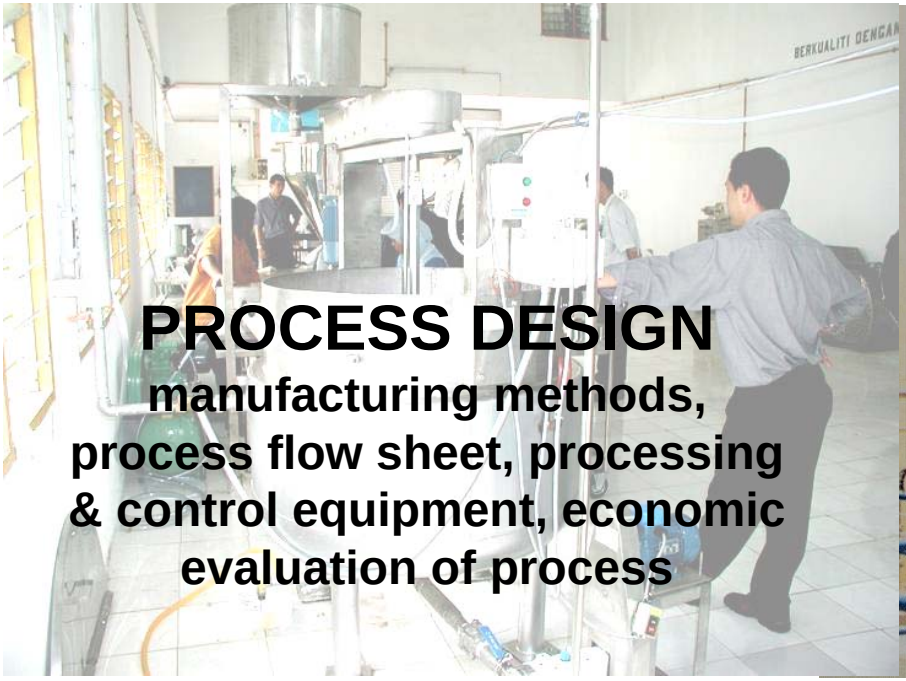
Electrical engineering

Industrial engineering

Food safety and food quality (process, equipment and processing plants must comply with strict hygienic regulation)

Biological materials → complex structure, inadequate data on physical and chemical properties

FOOD PROCESSINGPLANT DESIGN



BAGAIMANA DENGAN BAHAN MENTAHNYA?

APA YG AKAN DIBUAT?

PRELIMINARY STUDY OF RAW MATERIALS

PRELIMINARY STUDY OF PRODUCTS

PRELIMINARY STUDY OF DIFFERENT ALTERNATIVES IN FOOD PROCESSING TECHNOLOGY AND ENGINEERING

PRELIMINARY STUDY OF PRODUCTS	**Characterization of products (as broad as possible), including legal and commercial aspect, as well as consumption trend**
	Market analysis, base on quality and products specification. The evaluation must include of competing firm of every product
	Difficulties of distribution and supply of products
PRELIMINARY STUDY OF RAW MATERIALS	**Availability and location of raw materials**
	Cost of raw materials and transportation cost
	Trend for utilization of raw materials for other product → competition of raw material utilization
	Definition, specification and characterization of desired raw material in order to get the products specification
	Substitute of raw materials

LINGKUP PPI

(faktor-faktor perancangan)

BAHAN MENTAH

BERAPA/SEPERTI APA

Bahan hasil pertanian

Tidak stabil
Kontinuitas

Sifat komoditi

APA?
(peluang)

PERANCANGAN
PRODUK

PROSES, PERALATAN, UTILITIES
LAY OUT, SANITASI, AMDAL?

GEDUNG/BANGUNAN?
LOKASI DIMANA?

kajian dari prospek ekonomi
(investasi rendah,
beaya operasi kecil

KEUNTUNGAN

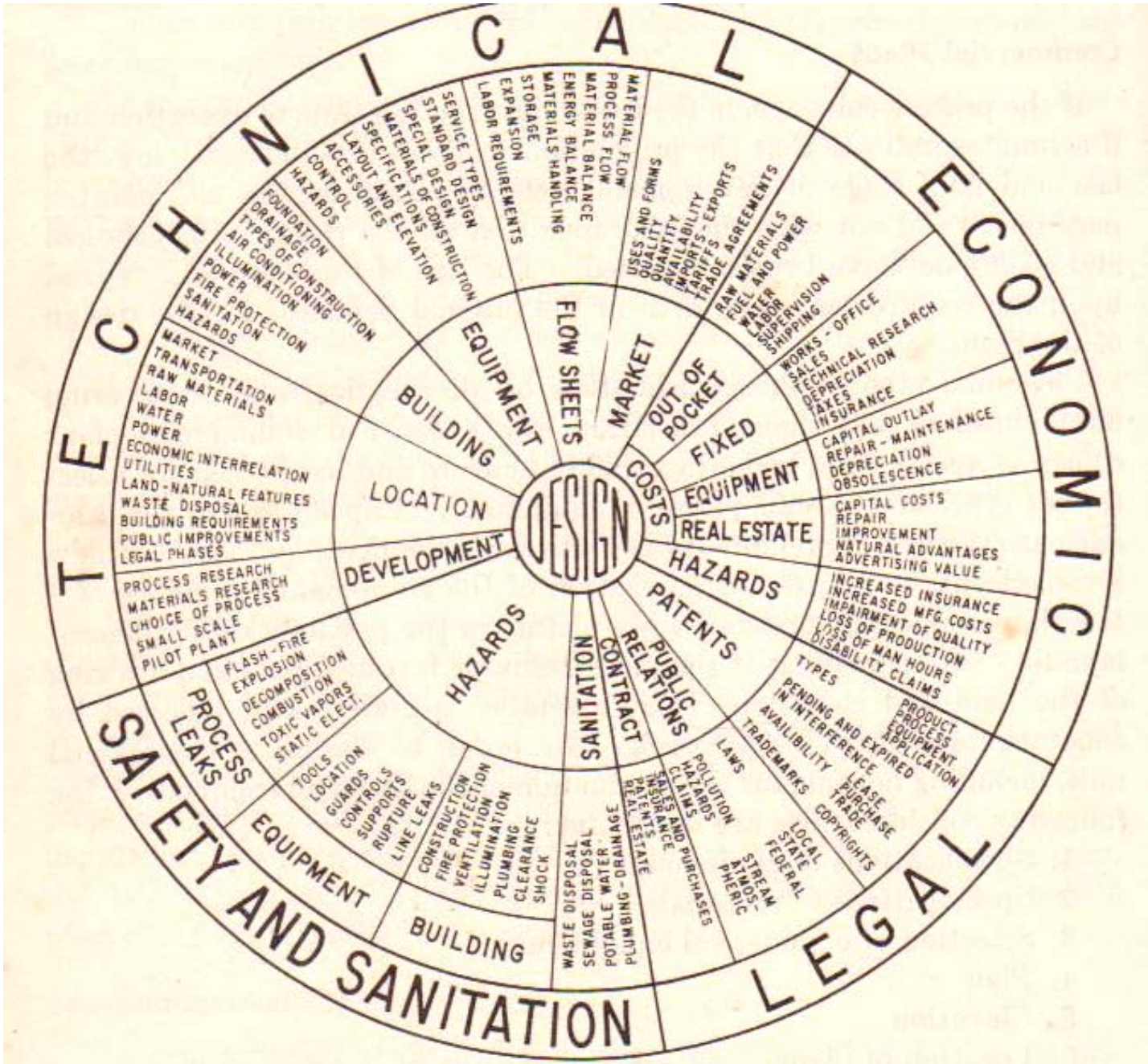


FIG. 2-2. Plant design factors.

PLANT DESIGN FACTORS

1. TECHNICAL

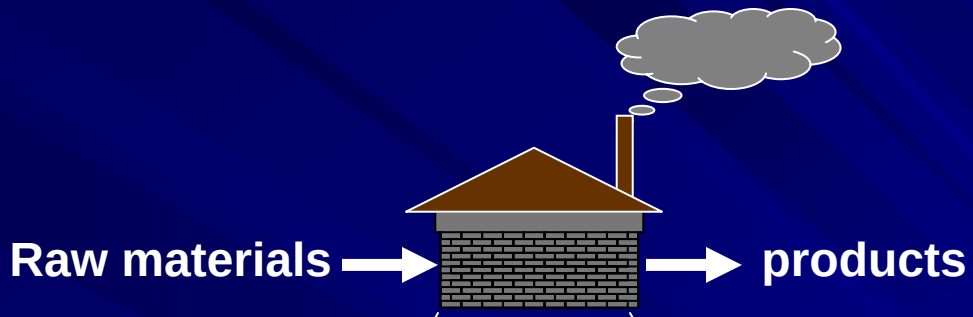
- **Market**
  - uses and form
  - quality
  - quantity
  - imports-export
  - trade agreement
- **Development**
  - process research
  - choice of process
  - small sclae
  - pilot plant
- **Flow sheet**
  - material flow
  - process flow
  - material and energy balance
  - material handling
  - storage & expansion
  - labor requirements
- **Equipment**
  - service type
  - standard / special design
  - material of construction
  - specification, capacity
  - lay out and elevation
  - accessories
  - sanitation
- **Building**
  - foundation
  - drainage
  - sanitation
  - type of construction
  - hazard
- **Location**
  - market, raw materials
  - utilities
  - economic interrelation
  - waste disposal

2. ECONOMICS

3. SAFETY AND SANITATION

4. LEGAL

(Vilbrandt: Chemical Engineering Palnt Design)



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UNIT OPERATION

Perilaku dan sifat bahan, ketersediaan

TEBU

Ciri dan sifat produk yang diinginkan

GULA PASIR




TEKNOLOGI (PROSES DAN PERALATAN)

NERACA BAHAN DAN ENERGI
SATUAN OPERASI, PERALATAN,
KETERSEDIAAN LISTRIK, AIR, TENAGA
PENANGANAN LIMBAH DAN SANITASI

HARUS UNTUNG → ANALISIS EKONOMI

PERLU PERHITUNGAN

CONTOH SOAL

Sebuah pabrik dirancang untuk mengolah 450.000 kg per jam juice apel encer dengan konsentrasi 5% menjadi juice apel pekat dengan konsentrasi 40%.Akan ditentukan apakah menggunakan single effect evaporator atau multiple effect evaporator. Investasi untuk single effect evaporator adalah $ 18.000, dan investasi yang sama untuk setiap tambah satu badan evaporator. Umur ekonomis badan evaporator adalah 10 tahun, dan nilai residunya diperkirakan $ 6.000 . Biaya penyusutan 20% per tahun didasarkan pada nilai investasi awal. Biaya untuk steam adalah $ 0,60 /1000 kg steam. Biaya administrasi dan biaya lain $ 40 per hari, tidak tergantung pada jumlah badan evaporator.

Jika X adalah jumlah badan evaporator, air yang dapat diuapkan adalah 0,9 X. Rancangan operasi adalah 300 hari / tahun. Jika berdasarkan pada analisis kelayakan, ROI minimum yang masih dapat diterima adalah 15%, berapa efect evaporator yang sebaiknya digunakan?