PRODUCT DESIGN

The Four C’s of Design

- Creativity
  - Requires creation of something new
- Complexity
  - Requires decision on many Variables and Parameters
- Choice
  - Requires making choices between many possible solutions
- Compromise
  - Requires balancing multiple conflicting requirements

Desain Produk: Dwi Purnomo
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Project Design

- Product Design & Process Planning
- Need Identification
- Operation Design
Types of Design Project

- Variation of Existing Product
- Improvement of Existing Product
- Development of New Product
- One-of-a-Kind Design

Morphology of Design

1. Conceptual Design
2. Embodiment Design
3. Detail Design
4. Planning for Manufacture
5. Planning for Distribution
6. Planning for Use
7. Planning for Retirement of the Product

Product Design Process

Conceptual Design
- Problem Definition
- Benchmarking
- QFD
- Project Planning
- Gather Information
- Concept Generation
- Evaluation of Concept

Configurational Design
- Configuration Design
- Parametric Design
- Detailed Design

Product Architecture
- Arrangement of Physical Elements to Carry out Function

Identifying Customer Needs

- Gathering Information from Customers
  - Interview, Focus Group, Customer Survey, and Customer Complaint
- Constructing Survey Instrument
- Evaluating Customer Needs
**Dimension of Quality for Manufactured Product**

- Performance
- Features
- Reliability
- Durability
- Serviceability
- Conformance
- Aesthetics
- Perceived Quality

**Customer Requirements**

- **Expected**
  - There are basic attributes that one would expect to see in the product

- **Spoken**
  - There are specific features that customer defines the product in terms of these attributes that one would expect to see in the product

**Customer Requirements**

- **Unspoken**
  - These are specific features that customers say they want in the product.

- **Exciters**
  - These are product features that make the product unique and distinguish it from the competition

**Quality Function Deployment**

A Planning and Problem Solving Tool for Translating Customer Requirements Into the Engineering Characteristics of Product (Engineering Parameters)
**Correlation Matrix**

1. Customer Requirement
2. “What?”
3. Engineering Characteristic

**Relationship Matrix**

4. 1
5. Correlation Matrix
6. 2
7. Competitive Assessment
8. 3
9. Importance Rating
10. Absolute Importance
11. Relative Importance
12. Technical Competitive Assessment
13. Technical Difficulty
14. Target Value

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**Conceptual Design**

Process by which the design is initiated, carried to the point of creating a number of possible solution, and narrowed down to a single best concept.

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**Product Design Specification**

A Document Which Contains All of the Facts Related to the Outcome of the Product Development

- In Use Purpose and Market
- Functional Requirements
- Corporate Constraint
- Social, Political, and Legal Requirements

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**Process Planning**

Planning of production processes based on the product design starting from raw material in to finish good
Chart describe the operation making process from the beginning (material input) to the finish (finished good).

ASME symbol:
- Operation
- Inspection
- Operation and Inspection
- Storage
- Flow

- Cutting
- Circular Saw
- Forming
- Press
- Make Screw
- Drilling
- Assembly & Inspection
- Manual

OPERATION SYSTEM DESIGN

PERANCANGAN SISTEM

Analisis Permintaan
Perancangan Produk Dan Proses
Penentuan Klasitas
Penentuan Lokasi
Perancangan Lay Out
### Analisis Permintaan

<table>
<thead>
<tr>
<th>Analisis Peluang Pasar</th>
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<tbody>
<tr>
<td>Proyeksi Demand Potential ( (Do) )</td>
</tr>
<tr>
<td>Market Share ( (S) )</td>
</tr>
<tr>
<td>Proyeksi Demand Effektif ( (De) )</td>
</tr>
<tr>
<td>[ De = S \cdot Do ]</td>
</tr>
</tbody>
</table>

### Sumber Peluang

- The Unexpected
- The Incongruity
- Process Need
- Change
  - Struktur Industri dan struktur pasar
  - Demografi
  - Rasa, “mood”, dan makna
- New Knowledge

### Prinsip Inovasi

- Dimulai Dengan Analisis Peluang
- Bersifat Konseptual Dan Perseptual
- Sederhana Dan Terpusat
- Mulai Dengan Yang Kecil
- Ditujukan Untuk Menjadi Leader

### Persyaratan

- Berorientasi Pada Pasar
- Bekerja Hanya Pada Satu Bidang Saja
- Membangun Berdasarkan Kekuatan Sendiri
Demand Potential

Totalitas permintaan produk/jasa tanpa memperhatikan siapa yang akan memasok

Market Size

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Metoda Proyeksi

- Market Research
- Kualitatif
- Kuantitatif
  - Time Series
  - Causal

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Demand Effective

Jumlah permintaan produk/jasa yang diminta konsumen yang dapat diraih oleh pemasok tertentu

Merupakan bagian dari demand potential

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Analisis Market Share

Analisis Persaingan

5 Forces (Porter)
- Substitute
- Supplier
- Buyer
- New Entrance
- Competitor

Pengertian Kapasitas

Kapasitas Adalah Kemampuan Maksimum Dari Suatu Fasilitas Persatuan Waktu

Design (Co) Effektif (Ce) Aktual (Ca)
(Designer) (Planner) (Executor)

Keterkaitan Antar Kapasitas

Langkah Perhitungan Co

Demand Effective
Kapasitas Effektif
Strategi Kapasitas
Kapasitas Design
Loss (L)
Effisiensi (E)
CCR (R)
Kapasitas Efektif

\[ Ce = De/(1-L) \]

Dimana:
- \( L \): loses karena
  - Kerusakan di gudang
  - Kerusakan transportasi
  - Waranty
  - Sales program

Strategi Kapasitas

**Policy A**: Capacity leads demand

**Policy B**: Capacity in approximate with demand

**Policy C**: Capacity legs demand

**Capacity Cushion Ratio**

\[ R = (Cx - Cs)/Cx \]

Dimana:
- \( R \): Capacity Cushion Ratio
- \( Cx \): Marginal Profit
- \( Cs \): Marginal Production

Strategi Kapasitas

- **Lead Demand**: \( R > 0.5 \)
- **Lag Demand**: \( R < 0.5 \)
- **Equal Demand**: \( R = 0.5 \)
Kapasitas Design

\[ Co = C_0/E \]

Dimana:

- \( E \): Effisiensi Pabrik