Chapter 4 제품 및 서비스 설계
(Product and Service Design)

* Product life cycle
<1> Product Design Process

(1) Typical Phase of Product Development

① Concept Development: 고객의 요구, 이용 가능한 기술로부터 아이디어
실행 가능한 아이디어: 시장 잠재력, 재무적 타당성, 생산적합성을 만족

② Product Planning: early system prototype

③ Product/Process Engineering:
  • full-scale prototypes(원형): 비용, 품질 및 제품 성능 간의 상충관계 고려
    기술적 test & 시장 test: (설계변경)
  • design of the process

④ Pilot Production/Ramp-Up(시험생산): Build pilot unit in commercial
  process

⑤ Market Introduction(양산): Ramp up plant to volume target
  (meet targets for quality, yield, and cost)
(cf) (pp.95–101, <도표 4-1>)

Phase 0: Planning
Phase 1: Concept Development
Phase 2: System-Level design
Phase 3: Design Detail
Phase 4: Testing and Refinement
Phase 5: Production Ramp-up
(2) Concurrent Engineering

• Traditional Approach:
  We design it, you build it or Over the wall

• Concurrent Engineering:
  Let’s work together simultaneously

• The simultaneous development of project design functions, with open and interactive communication existing among all team members for the purposes of reducing time to market, decreasing cost, and improving quality and reliability.
Designing for the customer

(1) 품질기능전개 (QFD, quality function deployment) :
(pp.106–108)

- Procedure for transform customer requirement (Voice of the customer) & competitor capabilities into provider target (technical design requirement)

- Interfunctional teams from marketing, design engineering, and manufacturing
* House of Quality:

Customer requirements information forms the basis for this matrix, used to translate them into operating or engineering goals.

Step1) CA(customer attribute) 파악, Importance
Step2) competitive assessment
Step3) EC(engineering characteristics) 개발
Step4) relationship matrix, tradeoff matrix
Step5) technical assessment
Step6) Target values

* VOC, Kano Model of Quality
EXHIBIT 3-4  “House of Quality” Dry Cleaners

Customer requirements

<table>
<thead>
<tr>
<th>Importance to customer</th>
<th>Operating requirements</th>
<th>Good training</th>
<th>Clean D.C. solvent</th>
<th>Clean D.C. filters</th>
<th>No rust in S.P. lines</th>
<th>Firm press pods</th>
<th>Good equipment maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely clean</td>
<td>1</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Perfect press</td>
<td>2</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>No delay at counter</td>
<td>5</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Quick turnaround</td>
<td>3</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>Friendly service</td>
<td>4</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>

Importance weighting

| Importance weighting | 15 | 9 | 9 | 9 | 9 | 19 |

Target values

<table>
<thead>
<tr>
<th>4 hr. formal, 2 wk. O.J.T.</th>
<th>Visual daily, clean monthly</th>
<th>Visual daily, change monthly</th>
<th>Monthly, plus as needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

Technical evaluation

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
</tr>
</tbody>
</table>

Correlation:

- 📱 Strong positive
- 📱 Positive
- 📱 Negative
- 📱 Strong negative

Competitive evaluation

- X = Us
- A = Comp. A
- B = Comp. B
- (6 is best)

Relationships:

- 📱 Strong = 9
- 📱 Medium = 3
- 📱 Small = 1
• Achieve equivalent or better performance at a lower cost while maintaining all functional requirements defined by the customer.

• 가치 = 유용성 / 비용

비용: 제품이나 서비스의 가치를 창출하는데 드는 자원의 절대적 개념
유용성: 품질, 신뢰도 및 제품의 성능

Brainstorming such questions as (p.109)
Greatest improvements related to DFMA arise from simplification of the product by reducing the number of separate parts:

. During the operation of the product, does the part move relative to all other parts already assembled?
. Must the part be of a different material or be isolated from other parts already assembled?
. Must the part be separate from all other parts to allow the disassembly of the product for adjustment or maintenance?