ITM515 STRATEGIC TECHNOLOGY MANAGEMENT

Chapter 11

Managing New Product Development Process

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Overview

- Some statistics on new product development (NPD)
  - In some industries, firms depend on products introduced within the past five years for more than 50% of sales
  - More than 95% of all NPD projects fail to result in an economic return

- How to make the NPD process more effective and efficient
  - Key objectives of NPD process
  - Methods for achieving the objectives
  - Tools for improving the effectiveness and efficiency

Objectives of the New Product Development Process

- Maximizing fit with customer requirements
  - Knowing which features are most important to customers
    - ✓ Not having a clear sense of customer requirements may result in overinvesting in wrong features at the expense of features the customer values more
  - Knowing what a customer is willing to pay
    - ✓ Overestimating the customer's willingness to pay for particular features may lead firms to produce feature-packed products that are too expensive
  - Knowing how to resolve competing customer desires
    - ✓ Firms may have difficulty in resolving heterogeneity in customer demands
    - ✓ A compromised product may fail to be attractive to any of customer groups

Objectives of the New Product Development Process

➢ Minimizing development cycle time

- Offering first-mover advantages: brand loyalty and technological leadership, preemption of scarce assets, exploiting buyer switching costs, and reaping increasing returns advantages
- Minimizing development costs: expense of paying employees, cost of capital
- Fully enjoying the product life cycles
- Quickly revising or upgrading offerings → Enjoying the second-mover advantages

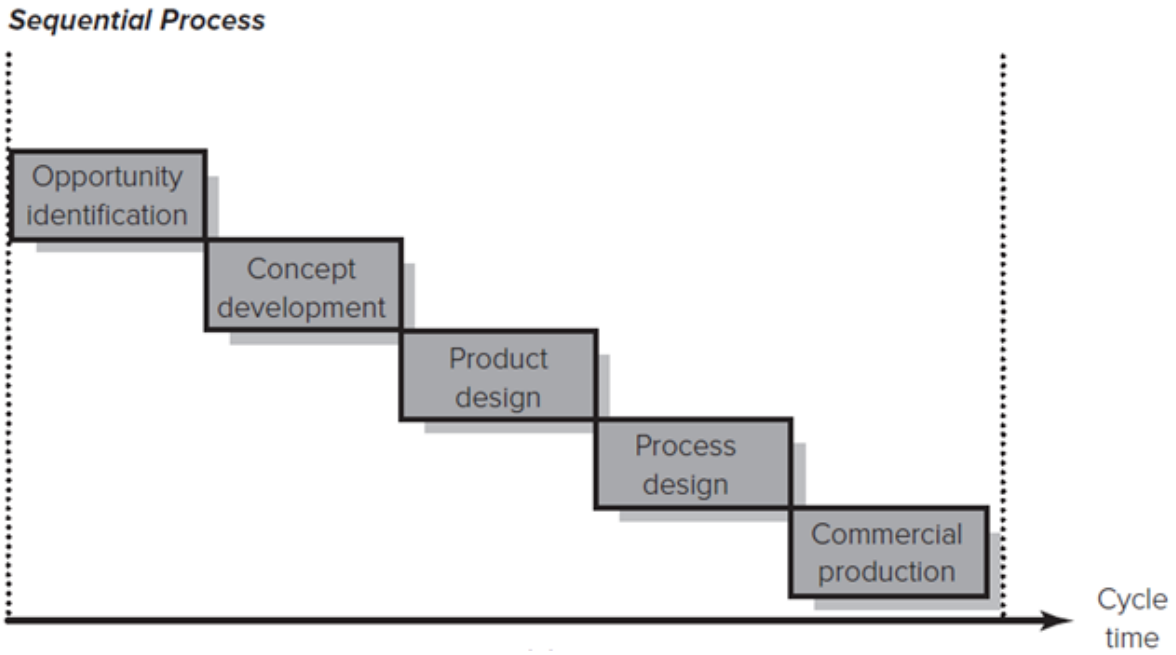
➢ Controlling development costs

- Development costs may be ballooned so much that it is impossible to recoup the development expenses even if a new product is enthusiastically received by the market
- The development efforts must be effective and efficient

Sequential versus Partly Parallel Development Process

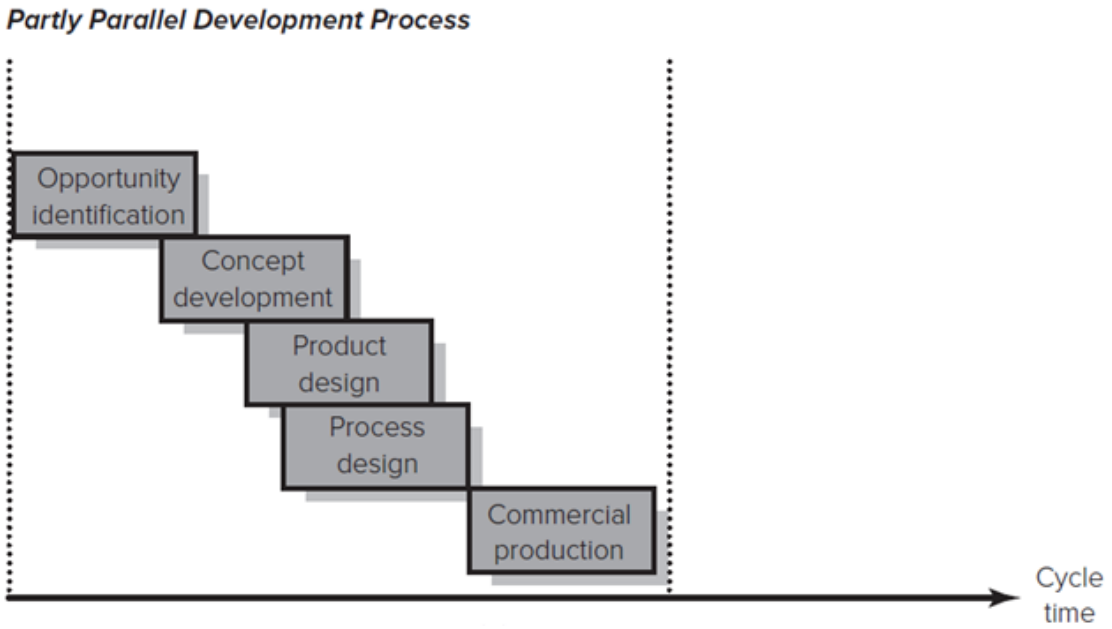
➢ Sequential process

- Proceeds from one stage to another in a sequential fashion
- Does not include early warning system
- Could be lengthened as the project iterates back and forth between stages



Sequential versus Partly Parallel Development Process

- Partly parallel process (concurrent engineering)
  - Some of the activities at least partially overlaps
  - Shortens overall development time, and enables closer coordination between stages
  - May increase the risk of costly rework



Involving Customers and Suppliers in the Development Process

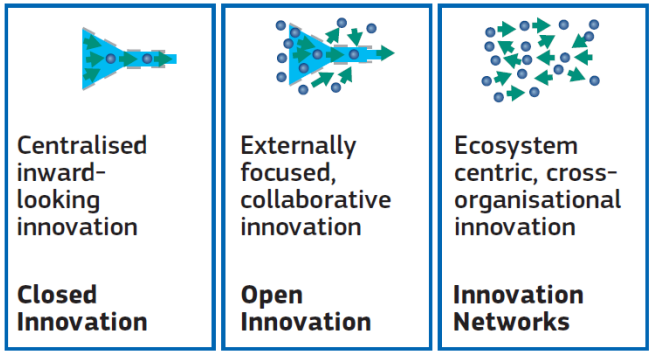
➢ Involving customers

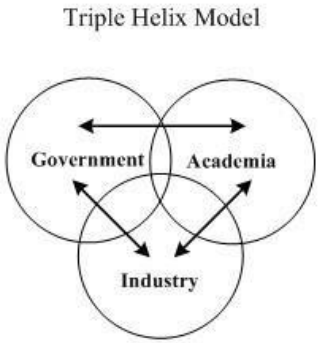
- Customer is often best able to identify the maximum performance capabilities and minimum service requirements of new product
- Customers may be involved in the NPD team or designing initial versions
- Firms may also get customer input early in the development process
  - ✓ Beta version: An early working prototype of a product released to users for testing and feedback
  - ✓ Agile development: Individual features or functionalities are developed into minimum viable products (MVPs) and presented to customers for feedback
- Reliance on "lead users" are more effective and practical than relying on a random sample of customers
  - ✓ Lead users: Customers who face the same general needs of marketplace but experience them earlier than rest of market and benefit significantly from solutions

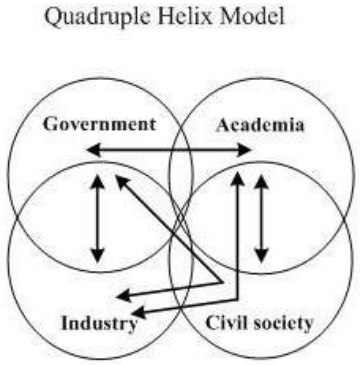
Involving Customers and Suppliers in the Development Process

➢ Crowdsourcing

- Open innovation 2.0: Innovation happens when a customer becomes a co-creator







- Definition: The process of obtaining needed ideas, resources or content by soliciting contributions from a large group of people, and especially from an online community
- Type
  - ✓ Crowd creation: Leveraging the crowd's skills and knowledge in creating new assets
  - ✓ Crowd funding: Funding projects by a multitude of people contributing a small amount in order to attain a certain monetary goal
  - ✓ Crowd curation: Gathering and selecting information relevant to a particular topic or area of interest

Involving Customers and Suppliers in the Development Process

➢ Involving suppliers

- Involving suppliers on NPD team or consulting as an alliance partner can improve product design and development efficiency
- Suppliers can suggest alternative inputs that reduce cost or improve functionality
- Managers can help to ensure that
  - ✓ inputs arrive on time
  - ✓ necessary changes can be made quickly to minimize development time

Tools for Improving New Product Development Process

- Stage-Gate Processes
- Quality Function Deployment (QFD)
- Design for Manufacturing
- Failure Modes and Effect Analysis
- Computer-Aided Design (CAD) / Computer-Aided Engineering (CAE) / Computer-Aided Manufacturing (CAM)
- Kano Model

Stage-Gate Processes

➢ Purpose

- Utilize tough go/kill decision points at the end of each stage of the design process
  - ✓ Move the project forward (go) / Abandon the project (kill) / Recycle the project
- Ensure that only those projects demonstrating increasing certainty with regard to success move forward

➢ Components of gates

- Deliverables: results of the previous stage and inputs for the review
- Criteria: questions or metrics used to make Go/Kill decision
- Outputs
  - ✓ Results of the gate review process
  - ✓ Including decisions such as go/kill/hold and action plans

Stage-Gate Processes

➢ Process

Idea Screen
Checklist of 'must meet' criteria

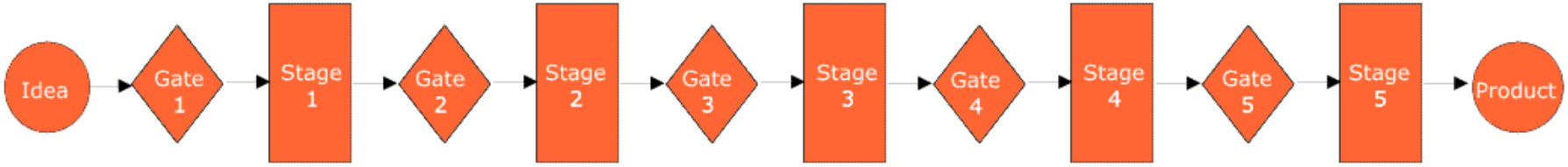
Concept Screen
1. Read all Concept stage documents
2. Fill in 'gate evaluation' sheet for Concept Screen
3. 'Gate result' is produced

Business Review
1. Review and approve documents in orange text
2. Fill in 'gate evaluation' sheet for Business Review
3. 'Gate result' is produced

Post-development Review
1. Review postmortem analysis for dev. process & quality.
2. Review and approve documents in orange text
2. Fill in 'gate evaluation' sheet for this gate.
3. 'Gate result' is produced

Pre-launch Review
1. Review and approve documents in orange text
2. Fill in 'gate evaluation' sheet for Pre-launch Review
3. 'Gate result' is produced

Project Review
1. Review project performance
2. Review product performance
3. Complete post-project audit



Idea Generation
Ideas stored in Idea Database from sources inside & outside the company.

Concept
Marketing documents:
- Preliminary Market Assessment
Technical documents:
- Statement of Work
- Initial Requirements
Finance documents:
- Financial Analysis

Business Case
Marketing documents:
- User Needs Research Plan
- User Needs Research Report
- Detailed Market Research
- Concept Test Plan
- Concept Test Report
Technical documents:
- SRS (Software Requirements Specification)
- Strategy Plan
- ITL (Issue Tracking Log)
- CMP (Configuration Management Plan)
Finance documents:
- Updated Financial Analysis
Production documents:
- Production Plan
- Distribution Plan
Team documents:
- Team Launch Report

Development
Marketing documents:
- Key Feature Test Plan
- Key Feature Test Report
- Product Launch Plan
- Marketing Plan
- Contingency Plan
- Concept Test Report
Technical documents:
- SRS
- HLD (High Level Design)
- DLD (Detailed Design)
- Source Code files
- User Help files
- Installation file produced
Finance documents:
- Updated Financial Analysis
Production documents:
- Updated Production Plan
- Updated Distribution Plan
Team documents:
- Postmortem Analysis

Market Testing
Marketing documents:
- Market Test Plan
- Market Test Report
Technical documents:
- User manual (optional)
Finance documents:
- Updated Financial Analysis

Commercialisation
Execute marketing launch plan
Implement production plan
Finalise IP position
Obtain formal compliance approval
Measure product financial performance
Prepare for project review
Contingency plan ready

Quality Function Deployment (QFD)

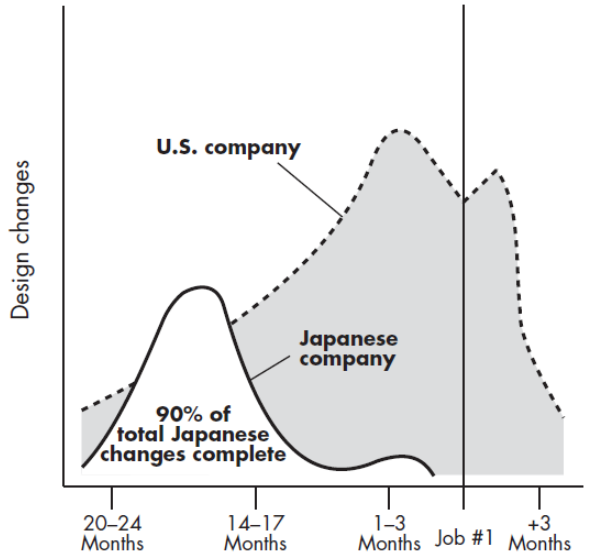
➢ Definition

- A system for translating customer requirements into appropriate technical requirements for product development
- A comprehensive process for improving communication and coordination between engineering, marketing and manufacturing personnel

➢ Advantages

- Providing a common language and framework for a cross-functional NPD team
- Aiding to produce higher quality products to market faster and at a lower cost
- Leading fewer design changes late in development

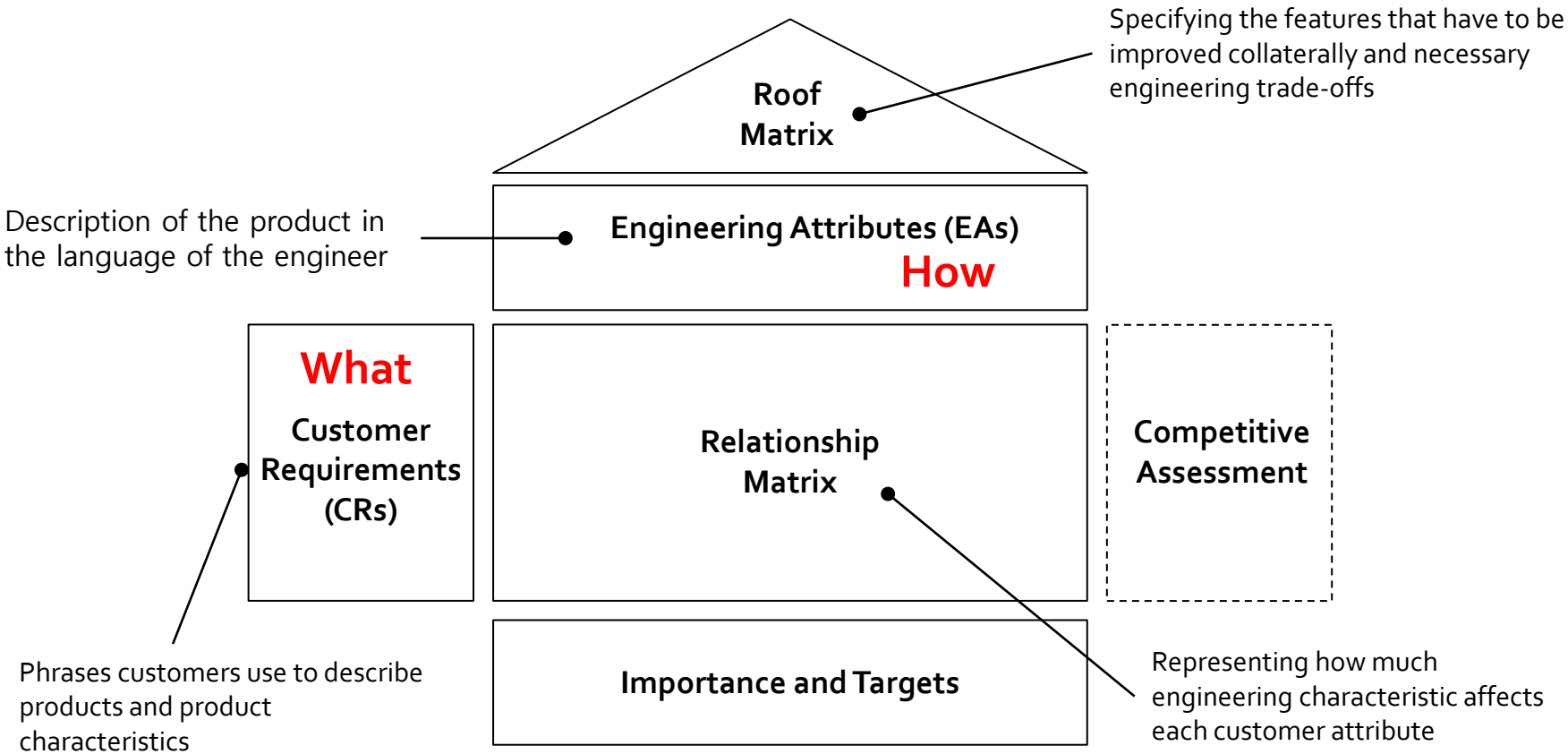
Japanese automaker with QFD made fewer changes than U.S. company without QFD



Quality Function Deployment (QFD)

➢ House of Quality (HoQ)

- A matrix mapping customer attributes against engineering characteristics



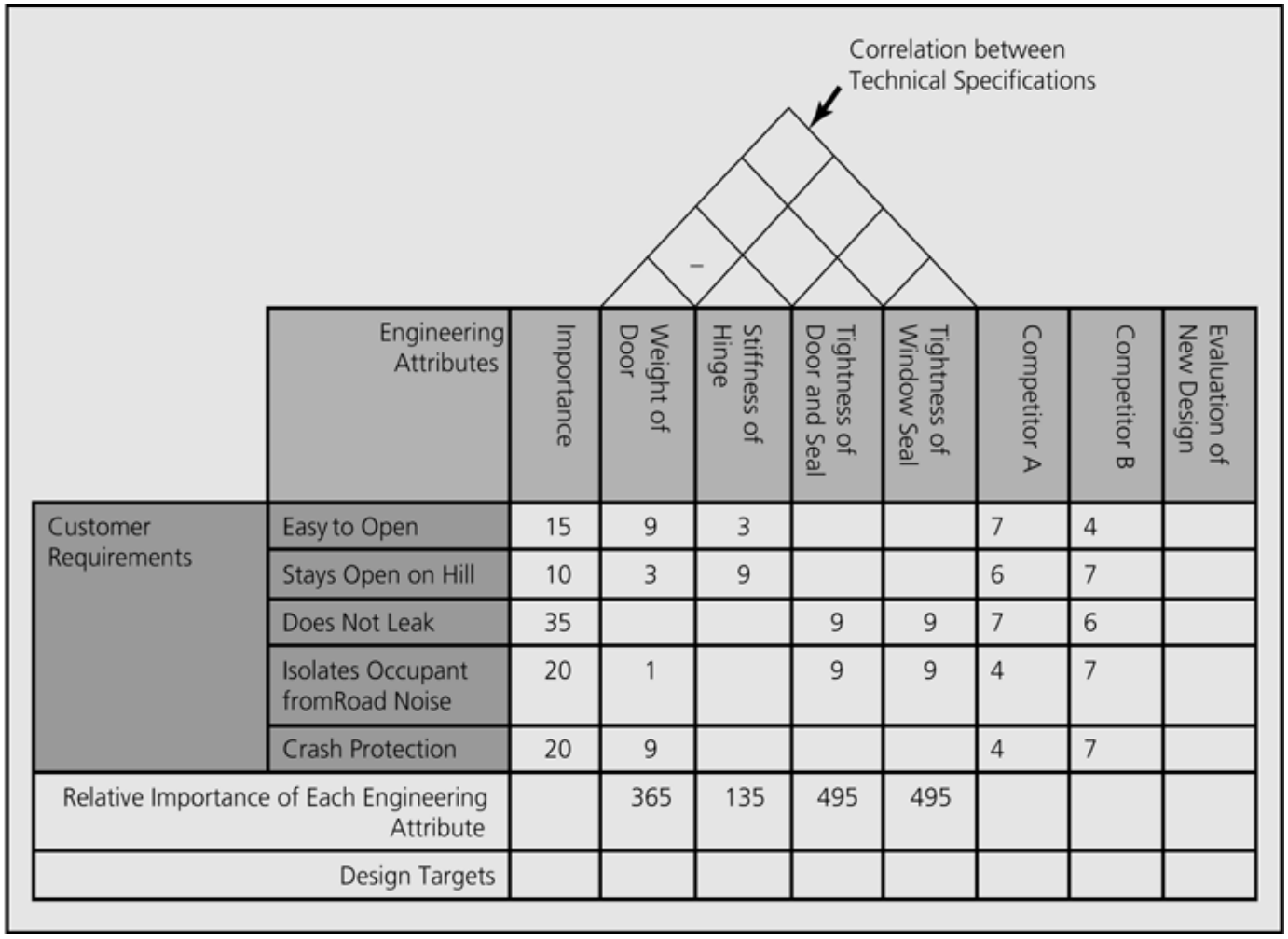
Quality Function Deployment (QFD)

Building the House

- 1) Identify CRs from market research
- 2) Weight CRs in terms of relative importance
- 3) Identify EAs that drive product performance
- 4) Complete the roof matrix by entering correlations between EAs
  - ✓ Assessing the degree to which one EA may positively or negatively affect another
- 5) Complete the relationship matrix
  - ✓ Assessing the relationship between an EA and a CR
- 6) Calculate the relative importance of EAs
  - ✓ Multiplying the CR rating by the feature's relationship to an EA
- 7) Evaluate the competition by rating their success in meeting CRs
- 8) Determine target values for each EA
  - ✓ Comparing the relative importance ratings to the competitor's score

Quality Function Deployment (QFD)

- Building the House: Car door



	Engineering Attributes	Importance	Weight of Door	Stiffness of Hinge	Tightness of Door and Seal	Tightness of Window Seal	Competitor A	Competitor B	Evaluation of New Design
Customer Requirements	Easy to Open	15	9	3			7	4	
	Stays Open on Hill	10	3	9			6	7	
	Does Not Leak	35			9	9	7	6	
	Isolates Occupant fromRoad Noise	20	1		9	9	4	7	
	Crash Protection	20	9				4	7	
Relative Importance of Each Engineering Attribute			365	135	495	495			
Design Targets									

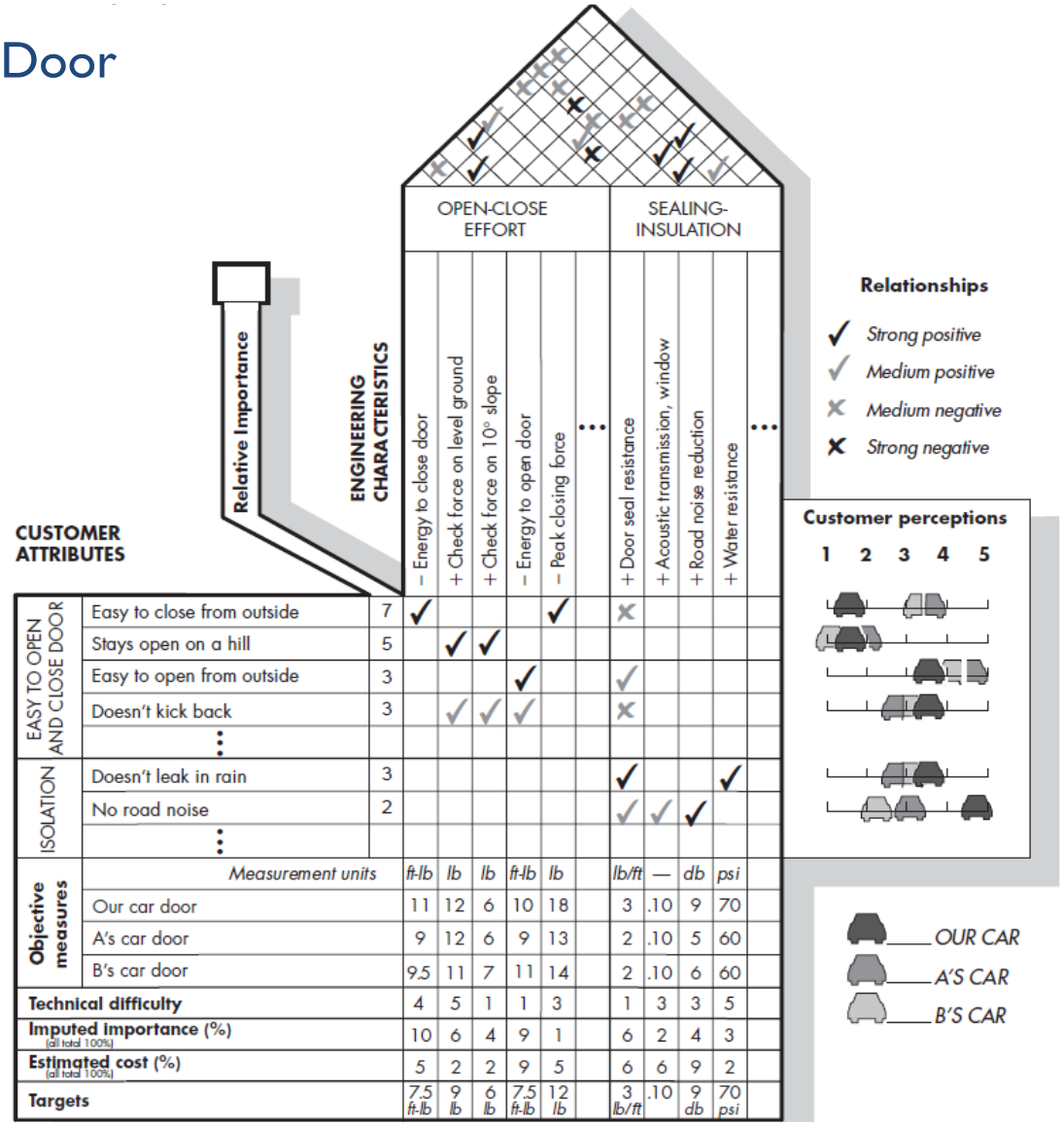
Quality Function Deployment (QFD)

➢ Using the House

- Identifying the relative importance of EAs and setting their target values
- Identifying EAs that should be considered together
- Examining whether the required CRs are well fulfilled by the EAs considered
  - ✓ Unmet CRs: If there is no entry in the row of EAs for a CR, new EAs need to be additionally included
  - ✓ Unnecessary EA: If there is no entry in the column of CRs for an EA, the EA should be excluded
- Evaluating the new design by assigning a score measuring how well the design meets each customer requirement

Quality Function Deployment (QFD)

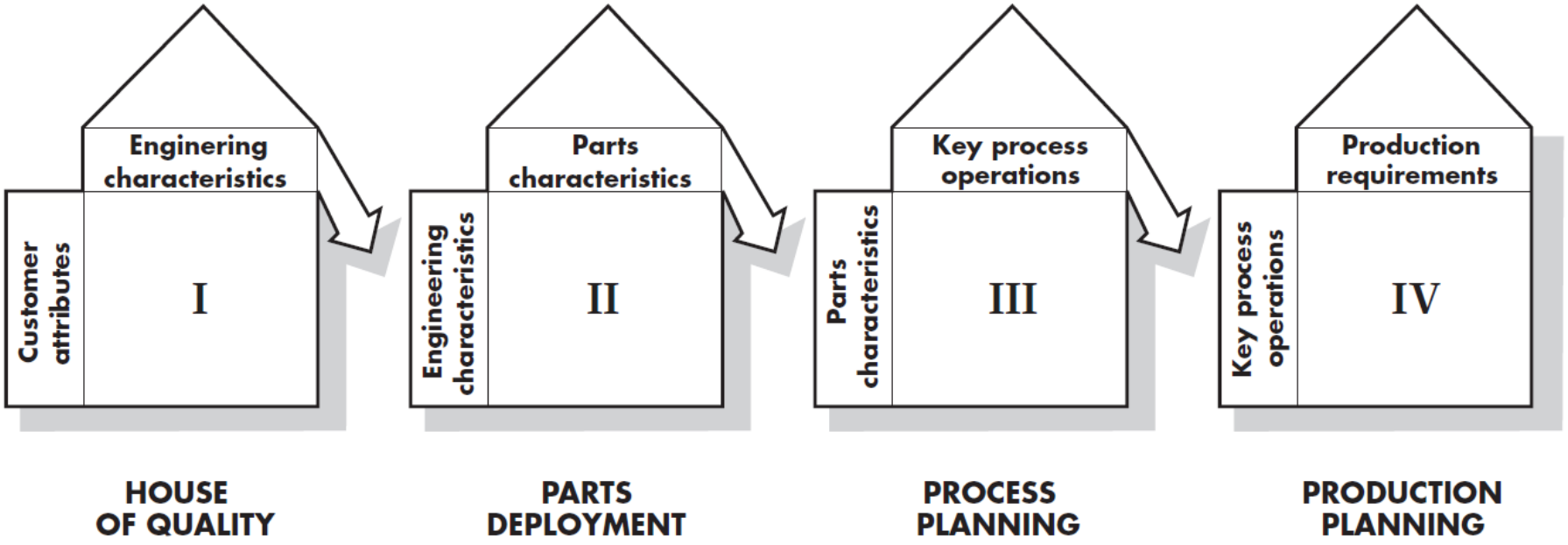
- Example: Car Door



Quality Function Deployment (QFD)

➢ The House Beyond

- The "hows" of one stage becomes the "whats" of the next
- The four linked houses implicitly convey the voice of the customer through to manufacturing



Kano Model

Basics

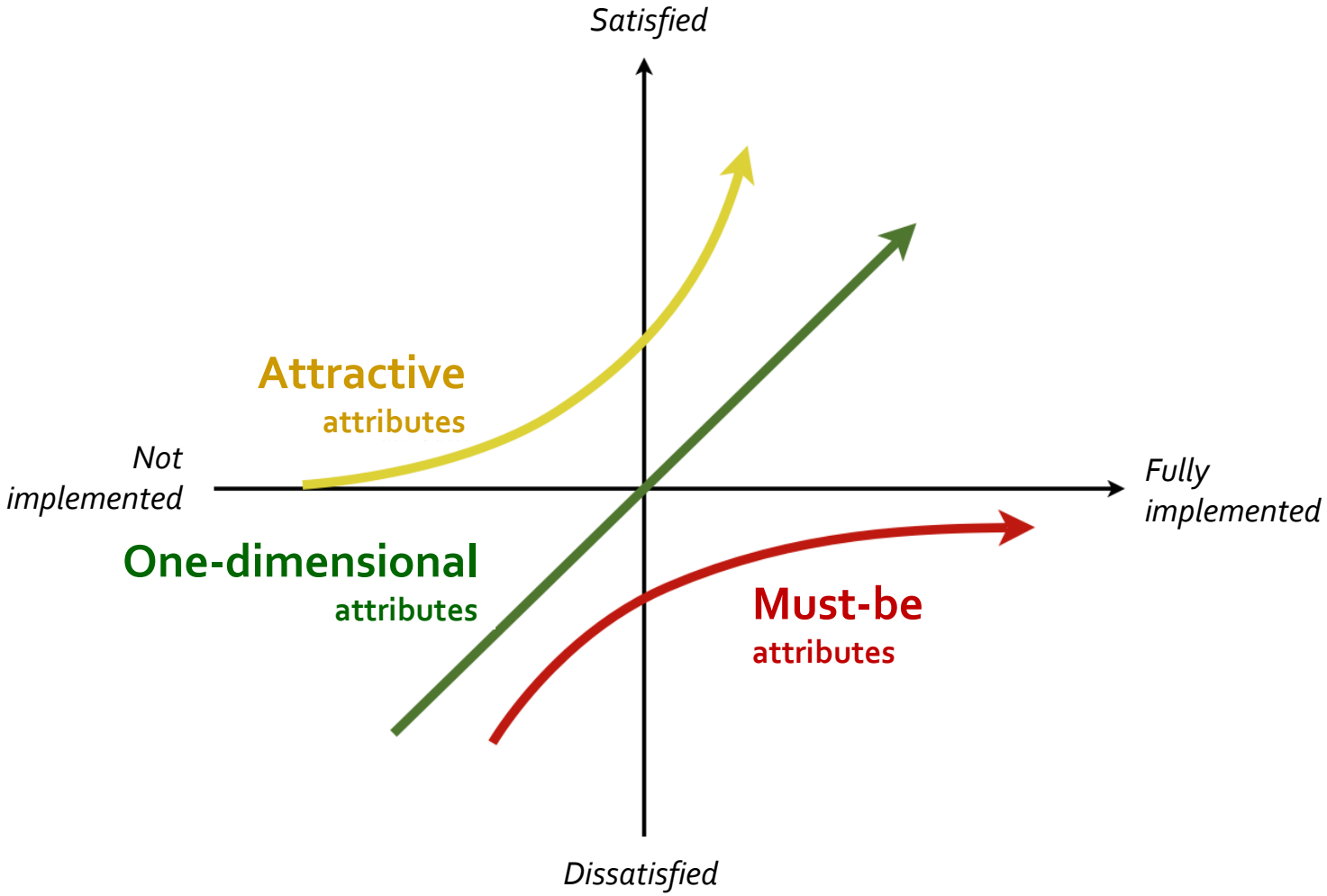
- Classifying product quality attributes (or customer requirements) which influence customer satisfaction in different ways
- Customer satisfaction is not an one-dimensional construction; fulfilling the requirements does not necessarily imply customer satisfaction

Advantages

- Better understanding of customer requirements
- Setting priorities of customer requirements for product development
- Can be optimally combined with QFD
- Discovering and fulfilling attractive requirements creates a wide range of possibilities for differentiation

Kano Model

- Types of customer attributes



Kano Model

- Types of customer attributes
  - Must-be attributes
    - ✓ If these attributes are not fulfilled, the customer will be extremely dissatisfied; however, their fulfillment will not increase satisfaction
    - ✓ Not explicitly demanded by customers since they take these for granted
    - ✓ Example: Brake performance in a car
  - One-dimensional attributes
    - ✓ Customer satisfaction is proportional to the level of fulfillment - the higher the level of fulfillment, the higher the customer's satisfaction and vice versa
    - ✓ Usually explicitly demanded by the customer
    - ✓ Example: Fuel efficiency of a car
  - Attractive attributes
    - ✓ Even if these attributes are not fulfilled, the customer are not dissatisfied; however, their fulfillment will lead to more than proportional satisfaction
    - ✓ Neither explicitly expressed nor expected by the customer
    - ✓ Example: Smart cruise control of a car

Kano Model

➢ Identifying types of customer attributes

- Step 1: Customer survey
  - ✓ Functional question: Asking about the consumer's feelings in the case of fulfilment of an attribute
  - ✓ Dysfunctional question: Asking about feelings in the case of non-fulfilment of an attribute

If the edges of your skis grip well on hard snow, how do you feel? Functional	1. I like it that way 2. It must be that way 3. I am neutral 4. I can live with it that way 5. I dislike it that whay
If the edges of your skis do not grip well on hard snow, how do you feel? Dysfunctional	1. I like it that way 2. It must be that way 3. I am neutral 4. I can live with it that way 5. I dislike it that whay

Kano Model

➢ Identifying types of customer attributes

- Step 2: Judgment for each customer

Attributes		Dysfunctional				
		1	2	3	4	5
Functional	1	Q	A	A	A	O
	2	R	I	I	I	M
	3	R	I	I	I	M
	4	R	I	I	I	M
	5	R	R	R	R	Q

M: Must-be
O: One-dimensional
A: Attractive
I: Indifferent
R: Reverse
Q: Questionable

- Step 3: Final evaluation – The category with the highest portion

Attributes	A	M	O	R	Q	I	Allocation
1	1	2	24	1	1	1	O
2		28			1	1	M
…	…	…	…	…	…	…	…

Kano Model

➢ Example: Personal cloud service

Category		Functions	Kano classification	Premium experience: Free user	Premium experience: Premium user	Purpose of use: Daily user	Purpose of use: Business user
Storage (A)	A_1	Storage capacity	O	O	M	O	O
	A_2	Smart synchronization	A	A	A	A	O
Accessibility (B)	B_1	PC access	M	M	M	M	M
	B_2	Mobile access	M	M	M	M	M
	B_3	Mobile offline folders	A	A	M	A	A
	B_4	Multiple account access	A	A	A	A	A
Security (C)	C_1	Saved file protection	M	M	M	M	M
	C_2	File transit protection	M	A	M	M	M
	C_3	Remote device wipe	A	A	M	A	M
	C_4	Enabling two-factor authentication	A	A	A	A	A
	C_5	Malicious attack detection	M	A	A	A	M
Sharing (D)	D_1	Shared folder	A	A	M	A	A
	D_2	Shared link	A	A	M	A	A
	D_3	Shared link controls	A	A	A	A	A
	D_4	Viewer history	A	A	A	A	A
Convenience (E)	E_1	Document scanning	A	A	A	A	A
	E_2	Camera upload	M	M	M	M	M
	E_3	Text content search	A	A	A	A	O
	E_4	Mobile-based editing	A	A	M	A	O
	E_5	File recovery and version history	A	A	A	A	A

Source: Lee, S., Kim, C., & Lee, H. (2023). What should be offered for free and what for premium in a freemium service? a two-stage approach of Kano & path analysis to the design of freemium services. *Technology Analysis & Strategic Management*, in press