Chapter 1

Introduction

- Product: Something sold by an enterprise to its customers
- Product Development: The set of activities beginning with the perception of a market opportunity and ending in the production, sale, and delivery of a product

1.1 Characteristics of Successful Product Development

- Dimensions to assess performance:
  - Product Quality: The degree to which a product meets customer expectations
  - Product Cost: The total cost incurred in producing and delivering the product
  - Development Time: The time taken from the initial concept to the market launch
  - Development Cost: The total cost incurred in the product development process
  - Development Capability: The ability of the organization to develop products effectively and efficiently

1.2 Participants in Product Development

- Central participants:
  - Marketing: Identifies market opportunities and customer needs
  - Design: Creates the product concept and specifications
  - Manufacturing: Plans and executes the production process
- Project team: The collection of individuals developing a product

  - Core team: A small group of individuals from different functions who work closely together throughout the project
  - Extended team: Includes additional members from other functions who contribute at various stages of the project

1.3 Duration and Cost of Product Development

- Duration: 3 to 5 years for complex products
- Cost: $\propto$ people involved and time taken

1.4 Challenges in Product Development

- Challanges characteristics:
  - Trade-offs: Balancing quality, cost, time, and capability
  - Dynamics: Adapting to changing market conditions and technologies
  - Details: Managing the complexity of product specifications and requirements
  - Time Pressure: Meeting tight deadlines while maintaining quality
  - Economics: Ensuring the product is financially viable
- Intrinsic attributes that make product development attractive:
  - Creation
  - Satisfaction of societal and individual needs
  - Team diversity
  - Team spirit

Chapter 2

Product Development Process and Organization

2.1 Product Development Process

- Product development process: The sequence of steps or activities that an enterprise employs to conceive, design, and commercialize a product
- Advantages of having a well-defined process:
  - Quality assurance: Ensures that the product meets customer expectations
  - Coordination: Facilitates communication and collaboration among team members
  - Planning: Helps in resource allocation and scheduling
  - Management: Provides a framework for monitoring progress and making adjustments
  - Improvement: Enables learning from past projects to enhance future performance
- Six phases of the generic development process:
  0. Planning
  1. Concept Development
  2. System-Level Design
  3. Detail Design
  4. Testing and Refinement
  5. Production Ramp-Up

2.2 Concept Development: The Front-End Process

- Identifying customer needs
- Establishing target specifications
- Concept generation
- Concept selection
- Concept testing
- Setting final specifications
- Project planning
- Economic analysis
- Benchmarking of competitive products
- Modeling and prototyping

Chapter 3

Opportunity Identification

3.1 Opportunity

- Opportunity: An idea for a new product

Types of Opportunities

- Two dimensions:
  - Solution (Technology, Method, Process)
  - Need (Market, Customer, User)

3.2 Tournament Structure of Opportunity Identification

- Goal: To take the opportunity articulated in the mission statement and do everything possible to assure it becomes the best product it can be
- 3 Basic Ways for Effective Opportunity Tournaments:
  - Generate a large number of opportunities
  - Seek high quality of the opportunities generated
  - Create high variance in the quality of opportunities

3.3 Opportunity Identification Process

- 6 steps:
  1. Establish a charter

2. Generate and sense many opportunities
3. Screen opportunities
4. Develop promising opportunities
5. Select exceptional opportunities
6. Reflect on the results and the process

Step 1: Establish a Charter

- Charter: Articulate the goals and establish the boundary conditions for an innovation effort
- Charter $\approx$ Mission statement for a new product
- Requires:
  - Resolving a tension between leaving the innovation problem unconstrained
  - Specifying a direction that is likely to meet the goals of the team and organization
- Recommended:
  - The innovation charter be broad. Benefit is that opportunities that may otherwise have never been considered will challenge the team's assumptions about what kinds of opportunities it should pursue

Step 2: Generate and Sense Many Opportunities

- Opportunities from various sources:
  - Internal sources: Employees, R&D, existing products
  - External sources: Customers, competitors, market trends, technology advancements
- Techniques for Generating Opportunities:
  - Follow a Personal Passion
  - Compile Bug Lists
  - Pull Opportunities from Capabilities (VRIN)
    - Valuable
    - Rare
    - Inimitable
    - Non-substitutable

  - Study Customers (Find latent needs)
  - Consider Implications of Trends
  - Imitate, but Better
    * Media and marketing activities of other firms
    * De-commoditize a commodity
    * Drive an innovation "down market"
    * Import geographically isolated innovations
  - Mine Your Sources (Mainly external sources)
    * Lead users
    * Representation in social networks
    * Universities and government laboratories
    * Online idea submission

Step 3: Screen Opportunities

- Goal: To eliminate opportunities that are highly unlikely to result in the creation of value and to focus attention on the opportunities worthy of further investigation
- **Not** to pick the single best opportunity
- Two methods for screening opportunities:
  - Web-based surveys
    * Fairness: Participants don't know the authors of the opportunities
    * At least 6 independent judgements, Recommended 10
  - Workshops with "multivoting"
    * Each participant presents one or more opportunities
    * Group multivotes on the opportunities
    * About 50 opportunities are good for a workshop. Can use a web-based survey to screen down to 50
    * Also pay attention to those with only a few very enthusiastic supporters

Step 4: Develop Promising Opportunities

- Goal: To resolve the greatest uncertainty surrounding each one at the lowest cost in time and money
- Determine:

  - The major uncertainties regarding the success of each opportunity
  - The tasks you could take to resolve the uncertainties
  - The approximate cost of each task
- Invest modest levels of resources in developing a few of them
- Additional tasks (customer interviews, testing of existing products, etc.)

Step 5: Select Exceptional Opportunities

- Method: RWW (Real, Win, Worth it)
  - Real: Is there a real market and a real product?
  - Win: Can we win? Can our product or service be competitive? Can we succeed as a company?
  - Worth it: Is it worth doing? Is the return adequate and the risk acceptable?

Step 6: Reflect on the Results and the Process

- How many of the opportunities identified came from internal sources versus external sources?
- Did we consider dozens or hundreds of opportunities?
- Was the innovation charter too narrowly focused?
- Were our filtering criteria biased, or largely based on the best possible estimates of eventual product success?
- Are the resulting opportunities exciting to the team?

Chapter 4

Product Planning

- An activity that considers both the current product line and the potential portfolio of projects that an organization might pursue

4.1 Product Planning Process

- Product plan: Identifies the portfolio of products to be developed by the organization and the timing of their introduction to the market
- Inefficiencies (no good product plan):
  - Inadequate coverage of target markets with competitive products
  - Poor timing of market introductions of products
  - Mismatches between aggregate development capacity and the number of projects pursued
  - Poor distribution of resources, with some projects overstaffed and others understaffed
  - Initiation and subsequent cancellation of ill-conceived projects
  - Frequent changes in the directions of projects

4.1.1 Types of Product Plans

- New Product Platforms: A set of products that share a common architecture and components, allowing for economies of scale and scope
- Derivatives of existing product platforms: Products that are based on existing platforms but have modifications or enhancements
- Incremental improvements to existing products: Small enhancements or modifications to existing products to improve performance, quality, or features

- Fundamentally new products: Products that are significantly different from existing offerings and may require new technologies or processes

4.1.2 Process

1. Identify Opportunities
2. Evaluate and Prioritize Projects
3. Allocate Resources and Plan Timing
4. Complete Pre-Project Planning
5. Product Development Process

Step 1: Identify Opportunities