# 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

## 4.2 Process

1. Identify Opportunities
2. Evaluate and Prioritize Projects
3. Allocate Resources and Plan Timing
4. Complete Pre-Project Planning
5. Reflect on the Results and the Process

### 4.2.1 Step 1: Identify Opportunities

- Opportunity funnel
- Recommend: each promising opportunity be described in a short, coherent statement and that this information be collected in a database

### 4.2.2 Step 2: Evaluate and Prioritize Projects

- To select the most promising projects to pursue
- Basic perspectives:
  - Competitive strategy
  - Market segmentation
  - Technological trajectories
  - Project platform

#### Competitive Strategy

- Defines a basic approach to markets and products with respect to competitors
  - Technology leadership
  - Cost leadership
  - Customer focus
  - Imitate

**Market Segmentation**

- Allows the firm to consider the actions of competitors and the strength of the firm's existing products with respect to each well-defined group of customers
- Can assess which product opportunities best address weaknesses in its own product line and which exploit weaknesses in the offerings of competitors

**Technological Trajectories**

- Key: When to adopt a new basic technology in a product line
- Conceptual tool: Technology S-Curve

**Project Platform Planning**

- The set of assets shared across a set of products
- Effective platform $\xrightarrow[Rapidly]{Easily}$ A variety of derivative products
- Key Strategy: Whether any project will develop a derivative product from an existing platform or develop an entirely new platform
- Technology roadmap:

**Evaluating Fundamentally New Product Opportunities**

- Market size (units/year×average price)
- Market growth rate (percent per year)
- Competitive intensity (range of competitors and their strengths)
- Depth of the firm's existing knowledge of the market
- Depth of the firm's existing knowledge of the technology
- Fit with the firm's other products
- Fit with the firm's core assets and capabilities
- Potential for patents, trade secrets, or other barriers to competition
- Existence of a product champion within the firm

**Balancing the Portfolio**

- Two specific dimensions:
  - The extent to which the project involves a change in the product line
  - The extent to which the project involves a change in production processes
- Advantage:
  - Be useful to illuminate imbalances in the portfolio of projects under consideration
  - In assessing the consistency between a portfolio of projects and the competitive strategy

### 4.2.3 Step 3: Allocate Resources and Plan Timing

**Allocate Resources**

- Aggregate Planning: Helps an organization make efficient use of its resources by pursuing only those projects that can reasonably be completed with the allocated resources
- Primary resource to be managed: The effort of the development staff (person-hours or person-months)
- Capacity utilization: 80% to 90%

**Project Timing**

- Timing of product introductions
- Technology readiness
- Market readiness
- Competition

**The Product Plan**

- The set of projects approved by the planning process, sequenced in time
- May include:
  - A mix of fundamentally new products
  - Platform projects
  - Derivative projects of varying size

### 4.2.4 Step 4: Complete Pre-Project Planning

- By: Core team
- Product vision statement: A brief description of the product and its intended market

**Mission Statement**

- Brief (one sentence) description of the product
- Benefit proposition
- Key business goals
- Target market(s) for the product
- Assumptions and constraints that guide the development effort
- Stakeholders

**Assumptions and Constraints**

- Considers the strategies of several functional areas within the firm
- Consider:
  - Manufacturing
  - Service
  - Environment

### 4.2.5 Step 5: Reflect on the Results and the Process

- Is the opportunity funnel collecting an exciting and diverse set of product opportunities?
- Does the product plan support the competitive strategy of the firm?
- Does the product plan address the most important current opportunities facing the firm?
- Are the total resources allocated to product development sufficient to pursue the firm's competitive strategy?
- Have creative ways of leveraging finite resources been considered, such as the use of product platforms, joint ventures, and partnerships with suppliers?
- ...

# Chapter 5

# Identifying Customer Needs