Chapter 1: Introduction to Innovation

Technological Innovation
Technological Innovation: the act of introducing new device, method or material for application to commercial, or practical objectives.

Importance of Innovation: new differentiated features, efficient manufactures
Influence of Innovation: (+) — wide range of goods and services, increases GDP. (-) — pollution

Information technology — faster Innovation:
Shorter lifecycle, production runs, new product introductions, greater market segmentation

Chapter 2: Sources of Innovation

Sources of Innovation:
individual, firm (most), university, government-funded research, private non-profit organization

Firm:
R&D (basic research/applied research, development) — most important source of innovation for firm
Other sources: customers or potential users, external network (competitors, suppliers, complementors), external sources of scientific and technological information (university, government-funded research)
Scientific Push & Demand Pull

Complementors
Complementors: producers of complementary goods or services are complementors (complement another good or service by adding value to both mutual customers)
e.g. for video game console, game developers are complementors.

University: encourage research leads to innovation, publication of research results, technology transfer (commercialization)

Government-funded research: own laboratories, incubators and science parks, grants for other research organizations

Private non-profit organization: in-house R&D, fund others, or both

Technology Clusters
Technology Clusters: the regional cluster of firms that have a connection to a common technology, may engage in same supplier, buyer and complementary relationship, as well as research collaboration.

Advantages: agglomeration economies (5)
1. Same supplier, buyer, complementor
2. Exchange of knowledge
3. Attract other firms
4. Suppliers and distributors to service (服务于) the cluster
5. Labor pool more valuable by giving more experience
6. Improve infrastructure

Disadvantages (3)
1. Proximity of competitors, reduce price power
2. Competitors obtain the proprietary knowledge (complex, tacit knowledge)
3. Pollution, erosion

Tacit Knowledge
Knowledge that cannot be readily codified (documented in writing form)

Technology spillovers
The benefits of the research activities of one firm spill over to other firms

Factors of likelihood (3):
1. Protection mechanism
2. Nature of underlying proprietary knowledge base
3. Mobility of labor pool

Chapter 3: Types and Patterns of Innovation
Types of Innovation
Product v.s. Process, Radical v.s. Incremental, Competence-Enhancing v.s. Competence-Destroying, Architectural v.s. Component, Sustaining v.s. Disruptive

Radical v.s. Incremental Innovation
Radical Innovation: an innovation that is very new and different from previously existing products or services
Incremental Innovation: an innovation that has minor change from existing products or services

Architectural Innovation
Architectural Innovation: an innovation that change the overall design of the system or the way components interact

Discontinuous Technology
Discontinuous Technology: the technology that fulfills the similar market needs but based on an entirely different knowledge base.

Traits:
Can prevent existing technologies from reaching their limits
Initially has lower performance than incumbent technology
Displace — steeper S-curve, higher performance limit

Technology S-curve
S-curve in technology improvement
S-curve in technology diffusion (innovation attributes, innovation decision, communication channels, nature of social system, promotion efforts)
Innovators, early adopters, easy majority, late majority, laggards

Technology Cycles
Ferment (turbulence), Incremental (not learning alternative designs, develop competencies over dominant design)

Zero Segment
Technology requirement faster than customer requirements — low-end market is important

Chapter 4: Standard Battles and Design Dominance

Increasing returns
Increasing returns: the rate of return from a product or process increases with the size of installed base. Many firms apply increasing returns to adoption, since when a technology is more and more adopted, it will be more and more valuable.

The sources of Increasing returns
Learning Effect (Absorptive Capacity)

Absorptive Capacity
Absorptive capacity: the ability of an organization of recognizing, assimilating, and utilizing the new knowledge.

Network Externalities
Network externalities: the value of a good to a user increases with the number of other users of the same or similar goods.

Self-reinforcing cycle: installed base, complementary goods
Large size installed base attract developers of complementary goods, wide-range of complementary goods attract users — increase installed base.

Installed base
Installed base: the size of the users of a particular good

Complementary good
Complementary good: additional goods and services that enable or enhance the value of other goods

Multiple dimensions of value (2)
1. Technology stand-alone value
2. Network externalities value (the size of installed-base, the availability of complementary goods)

The result: Winner-Take-All markets (3)
1. Natural Monopoly — firms supporting winning tech reward, others will be locked out
2. Path dependency — follows the technology trajectories (increasing returns)
3. Far-reaching influence — future technology inquiry

The result for customers
Network externality returns, Monopoly costs — both arises, S-curve, exponential-curve —> cross point — optimal market share

Market share expansion strategy (5)
1. Reduce purchase cost
2. Reduce learning cost
3. Take the lead to introduce the technology
4. Alliance, develop technology
5. Venture capital

Lock-in strategy (3)
1. Mainstream
2. Distinctive, incompatible with others
3. Integral discount for customers

Chapter 5: Timing of Entry

Entrants: first movers, early followers, late entrants

First movers
First movers: the first entrants to sell in a new product or service category

Pros (4)
1. Brand loyalty and technological leadership
2. Preemption of *scarce resources*
3. Exploiting user's switching costs
4. Reap the advantage of increasing returns

Cons (4)
1. Large expenses on development and research
2. Undeveloped supply and distribution channels
3. Immature enabling technologies and complements
4. Uncertainty of customers requirements

Early followers
Early followers: entrants that are early to market but not the first

Strategies to improve timing optional
Fast-cycle development processes — both be first movers, and refined its innovation in response to customer feedback (requirements), reap advantages of first and second movers.

Factors influence timing options
1. Customer's preference are certain
2. Improvement over previous
3. Enabling technologies
4. Complements (complementary goods)
5. Threat of competitive entry
6. Increasing returns to adoption
7. Early loss
8. Resources
9. Firm's reputation — reduce the uncertainty of customers

Chapter 6: Defining the Organization's Strategic Direction

How to assess the firm's current position (external analysis, internal analysis)
External analysis: Porter's five-force model + stakeholder analysis
Internal analysis: strength and weakness (primary + support activities), sustainable competitive advantage (rare, valuable, durable, inimitable — tacit/socially complex/path dependent/casually ambiguous)

Porter's five-force model
Degree of existing rivalry: #, differentiation, size, demand condiments, exit barriers
Threat of potential entrants: attractiveness, entry barrier
Bargaining power of suppliers: #, differentiation, certain supplier, certain firm, switching costs, vertical integration
Bargaining power of buyers

Threat of substitutes: #, closeness
Entry Barrier
Entry barrier: conditions that make it difficult and expensive to enter an industry (government regulation, high start-up costs)

Vertical Integration
Vertical Integration: get into the business of suppliers (backward) or buyers (forward)
Backward: produce its own supply
Forward: buy its distributors

Stakeholder analysis (who, what they want, what resources contribute, what claims)

Core Competencies
Core Competencies: a set of integrated and harmonized abilities that distinguish the firm in the marketplace.
Core Competencies (4)
1. Market interface (advertising, distribution)
2. Infrastructure
3. Technological abilities
4. High quality relationship between different functions and business units

Core Competencies should (3)
1. A significant source of competitive differentiation
2. Cover a range of business
3. Inimitable

Dynamic Capabilities
Dynamic Capabilities: a set of abilities that make firms more agile and responsive to changes, or enables a firm to quickly respond to changes.

Strategic Intent
A long-term goal that is ambitious

Chapter 7: Choosing Innovation Projects

R&D Intensity
R&D intensity: the ratio of R&D expenditures to sales.

Quantitative methods
Discounted Cash Flow (DCF)
Real Options

Qualitative methods
Screening Questions
The Aggregate Project Planning
Q-sort

Discounted Cash Flow (DCF)

Discounted payback period
Discounted payback period: the time required to break even on a project using discounted cash flows

Internal rate of return (IRR)
Internal rate of return: the discount rate that makes the net present value (NPV) of investment zero

Screening Questions (role of customers, role of capabilities, project timing and cost)

Conjoint Analysis: relative importance of different product attributes
DEA: multiple decision criteria

Chapter 8: Collaboration Strategies

Solo (4)
Availability of capabilities, protecting proprietary technologies, control technology development and use, build and renew capabilities

The advantages of collaboration (5)
1. Obtain skills and resource more quickly
2. Share the risks and costs
3. Reduce the assess commitment and increase flexibility
4. Learn from partners
5. Can build cooperation around a common standard

Types of Collaborative Arrangements (5)
Strategic Alliances, Joint Venture, Licensing, Outsourcing, Collective Research Organization

Alliance
Alliance: refer to any types of relationship between firms. Alliance can be short or long and may involve formally contracted agreements or be entirely informal.

Joint Venture
Joint Venture: a partnership between two or more firms that involves a significant equity stake of partners and often resulting in the creation of a new business entry.

Licensing
Licensing: a contractural arrangement that gives an organization or individual (a licensee) the right to use another's (licensor) intellectual property, typically in exchange for royalties.

Partner Selection: resource fit, strategic fit

Partner Monitoring (3)
alliance contracts, equity ownership, relational governance
Alliance contracts: obligation, when and how to distribute the collaboration, control of each partner, review and reporting requirements, provision for terminating relationship
Equity ownership: a sense of ownership and commitment
Relational governance: self-enforcing governance based on goodwill, trust, and reputation — built over time through shared experience of repeatedly working together

Chapter 9: Protecting Innovation

Appropriability
Appropriability: the degree to which a firm is able to capture the rents from its innovation.

Patents, trademarks, copyright, trade secrets

Copyright: reproduce, derivative work, distribute copies for sale, rental or lease, display, perform

wholly proprietary system v.s. wholly open systems (3 + 2)
Wholly proprietary system
1. are based on company-owned technology that is protected by patents or other protection mechanisms
2. incompatible with others, can capture rent from technology (high appropriability)
3. Customers may not adopt the technology (higher cost, incompatibility)

Wholly open system
1. can be accessed, augmented or distributed to other users
2. quickly commoditized, little appropriability

Advantages of protection or diffusion (2+2)
Advantages of protection
1. offer greater rent of appropriability
2. retain architectural control

Advantages of diffusion
1. higher adoption, a larger installed base and a strong market for complementary goods
2. additional development efforts from other organizations without additional costs

Architectural control
Architectural control: the ability to determine the structure and operation of the technology and its compatibility with other goods or services.

Chapter 10: Organizing for Innovation

Large firm size (4 + 3)
Advantages:
1. Obtain financing
2. Large economic scales, learning effects
3. Spread costs of R&D
4. More suitable for large scale of risky projects

Disadvantages:
1. Low R&D efficiency
2. Bureaucratic inertia
3. Tie to current technology (rigid)

Structural Dimensions of Firm
Formalization + Standardization + Centralization

Formalization
Formalization: the degree to which firm use rules and procedures to structure the behavior of employees

Centralization
Centralization: the degree to which decision-making authority is kept at top levels of the firm. The degree to which activities are performed at a central location.

Centralized authority: ensure project match firm-wide objectives
Centralized activities: avoid redundancy, maximize economies of scales, firm-wide deployment of innovation

Firm Structures (3)

Mechanistic Structures
Mechanistic Structures: an organization structure characterized by a high degree of formalization and standardization, causing operations to be almost automatic or mechanical

Organic Structures
Organic Structures: an organization structure characterized by a low degree of formalization and standardization

Ambidextrous Structures
Ambidextrous Structures: the ability of an organization to behave as two different kinds of company at once. Different divisions may have different structures and control systems, enabling them to have different cultures or patterns of operations
- Some divisions may be small and organic (R&D, new product lines)
- Other divisions may be larger and more mechanistic (manufacturing, mature product lines)

Managing Innovation Across Borders (4 strategies)
1. Center-for-global: all R&D centralized a single hub
2. Local-for-local: each division does own R&D for local (local needs, diverse resources)
3. Locally leverages: leverages the most creative ideas across company (improve diffusion of innovation)
4. Globally linked: decentralized R&D label but each play a different role and are coordinated centrally

Chapter 13: Crafting Deployment Strategy
Timing
Licensing and Compatibility
Pricing
Distribution
Marketing

Timing
Strategic Timing of Entry (business cycle & seasonal effects, generation of tech, production capacity and complement availability)

Cannibalization
Cannibalization: when a firm's sales of on product or at one location diminish its sale of another

Licensing and Compatibility
Protect too much: impede complements
Protect too little: low quality complements

Compatibility
Firm dominant — incompatible, controlled licensing for complements
Firm installed base disadvantage — compatible, aggressive licensing for complements

Backward Compatibility
Backward Compatibility: when products of a technological generation can work with the products of previous generations.
Backward Compatibility helps leverage installed base and complements of previous generations.

Pricing
Pricing objectives — survive, maximize market share, maximize current profits
Pricing strategies (3)
- Market skimming strategy
- Penetration pricing
- Manipulate perception of price (free trial, initial free then monthly service)

Market skimming strategy — high initial price
-: Attracts competitors, low adoption

Penetration pricing
Penetration pricing: when the price of product is very low or even free to maximize the good's market share.
- Use to compete for dominant design
- Accelerate adoption
- Early establish large production capacity

-: loss money in short run

Distribution
Intermediaries: manufacturer's representatives, wholesalers, retailers
Trend: disintermediation

Factors for choosing distribution type
How new fit with the existing?
Customers condition, product education or service, product trial, installation?
How competitors sold?

Strategies for accelerating distribution (4)
1. Alliances with distributors: provide with stake or exclusive contract can motivate distributors
2. Bundling relationships: sell with the product already in use
3. Contracts and sponsorship: discount, advertising assistance, special service contracts
4. Guarantee and consignment: reduce the risk to intermediaries and complements

Marketing

Advertising, promotions, publicity and public relations
Advertising: effective message, target market, balance
Promotion: price rebate, discount, free trial, addition products, pulling power, display functions…
Public relations: word-of-mouth, sponsor special events

Marketing plan for intended adopters (3)
1. Innovators, early adopters: technical content, leading edge nature of product (high content, selective reach)
2. Early majority: ease to fuse, completeness of products, consistency with customer's life and legitimacy (high reach, high credibility)
3. Late majority & laggards: reliability, simplicity, cost-efficiency (high reach, high credibility, low cost)

Using marketing to shape perceptions and expectations (3)
- Preannouncement and press releases: build mind share, forestall competitors
- Reputation: provide likelihood of success
- Credible commitments: substantial irreversible investment, show determination