creativity

innovation

Innovation, Creativity &
Commercialization

TOPIC OUTLINE

- Stimulants of Innovation

- Objectives of Innovation

- Categories of Innovation

- Types of Innovation

- Elements of Successful Innovation

- Models of Innovation

- Innovation Framework and Strategy Development

LESSON OUTCOMES

1. Recognize the importance and different types of innovation

2. Describe the changing views of innovation over time

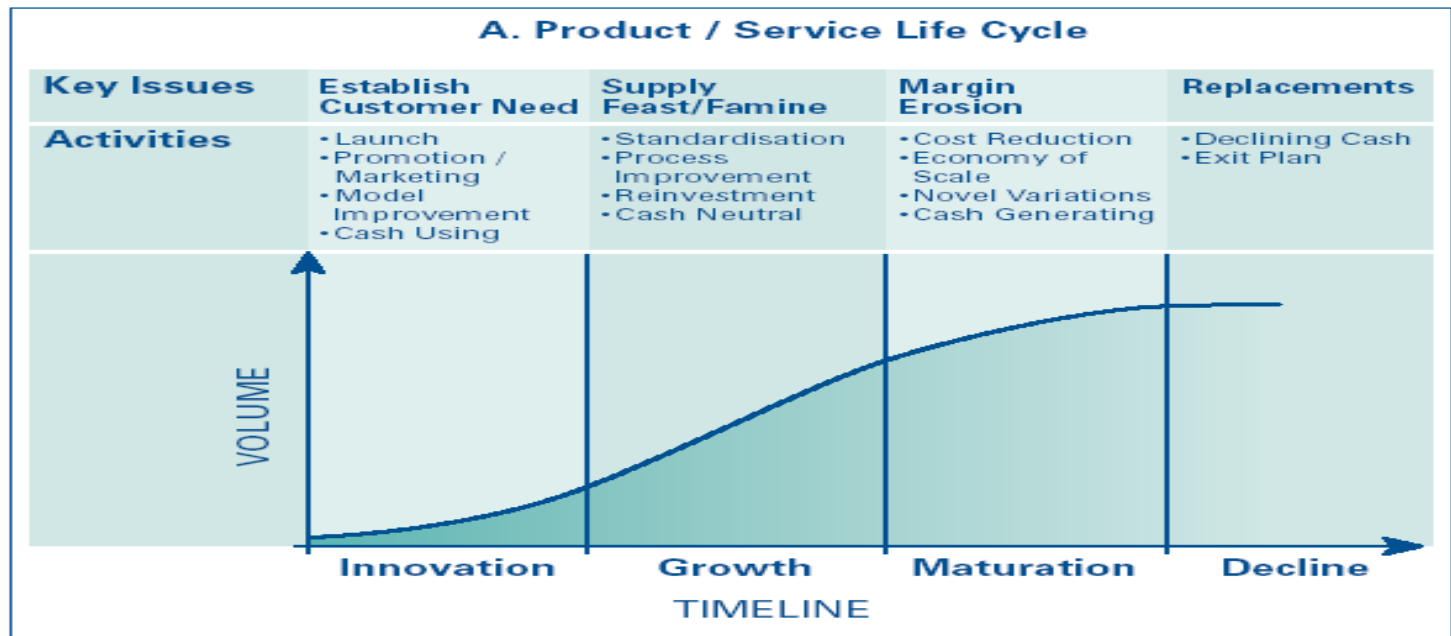3. Explain the main concept and frameworks in developing innovation strategy

STIMULANTS OF INNOVATION

Various factors have been recognised as being the driving forces of innovation to businesses.

- **Negative Forces**
  1. Products or services which experiencing the declining stage of their life cycle

A. Product / Service Life Cycle

Key Issues	Establish Customer Need	Supply Feast/Famine	Margin Erosion	Replacements
Activities	• Launch • Promotion / Marketing • Model Improvement • Cash Using	• Standardisation • Process Improvement • Reinvestment • Cash Neutral	• Cost Reduction • Economy of Scale • Novel Variations • Cash Generating	• Declining Cash • Exit Plan

VOLUME

Innovation • Growth • Maturation • Decline

TIMELINE

STIMULANTS OF INNOVATION

- **Negative Forces (cont.)**

    2. A business's position at the declining stage of its life cycle.

    3. Aggressive global competition

    4. Increasing regulation

    5. Rapidly advancing technology

    6. Increasingly complex market

STIMULANTS OF INNOVATION

- Positive Forces

1. Opportunity for the exploration of new market

2. Deregulation

3. Lower entry barriers for new players in a market or industry

"Businesses that fail to learn and adopt the changes and opportunities (i.e. become innovative) are unlikely to succeed"

OBJECTIVES OF INNOVATION

- Businesses may improve their chances of producing successful innovation by setting objectives to be attained along with the process.

- Three important objectives:

  1. to reduce development costs

  2. to reduce product lead time

  3. to improve product quality

- Meeting all of them is not an easy task because of trade-offs between them.

  E.g. : *A low cost of product development may be achieved by the utilisation of low-skilled labour, but in return, the product quality will be sacrificed.*
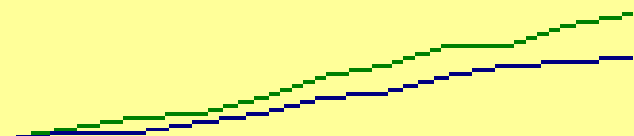
CATEGORIES OF INNOVATION

RADICAL INNOVATION:
Project Trajectory

INCREMENTAL INOVATION:
Project Trajectory
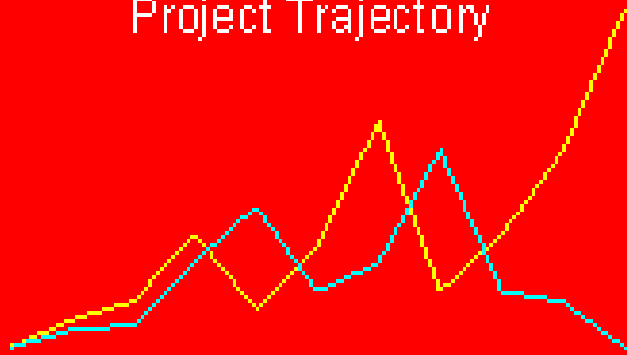
- Explores new technology
- High uncertainty
- Focuses on products, processes or services with unprecedented performance features
- Creates a dramatic change that transforms existing markets or industries, or creates new ones

- Exploits existing technology
- Low uncertainty
- Focuses on cost or feature improvements in existing processes, products or services
- Improves competitiveness within current markets or industries

Uncertainty Levels

	Incremental	Radical
Technical	Low	High
Market	Low	High
Organizational	Low	High
Resources	Low	High

	Incremental	Radical
Emphasis	Cost or feature improvements in existing products, services, or processes	Development of new businesses, products and/or processes that transform the economies of a business
Technology	Exploitation of existing technology	Exploration of new technology
Prototyping	Ironing out wrinkles near the end of the design phase	Teaching the market about the new technology and learning from the markets how valuable that technology is in that application arena

|		
Business Case	Detailed plan can be developed at the beginning of the process	Business model and plan evolves through discovery-based learning
Resources and competencies	Standard resource allocation; the team has all competencies required to complete the process	Creative acquisition of competencies and resources from a variety of internal and external sources
Operating Unit Involvement	Formal involvement from the very beginning	Informal at early stages → formal at later stages

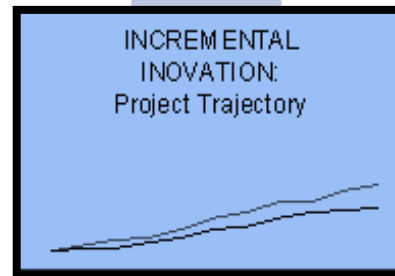* Both need to be managed differently

CATEGORIES OF INNOVATION

RADICAL INNOVATION:
Project Trajectory

Create an essentially different kind of product – require customers to radically change their past behavior
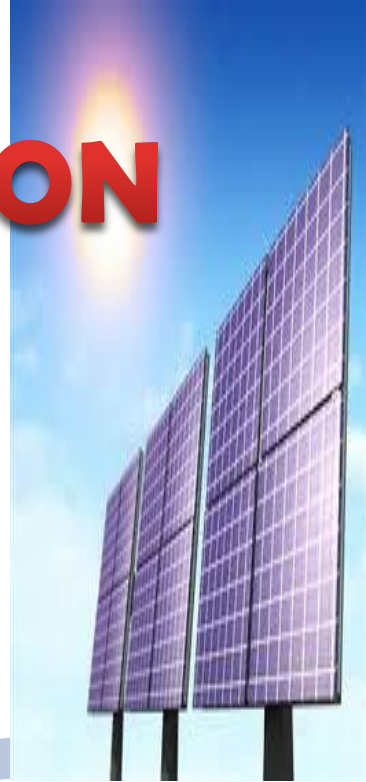
Make small-step improvements to the original technology and design

INCREMENTAL INOVATION:
Project Trajectory

CATEGORIES OF INNOVATION

	Product	Service	Process	Business Model
Radical	Hydrogen powered cars	A new kind of mortgage	Gas-filled thermo glass panes	Online sales & distribution of computers
Incremental	New car model	Different mortgage feature	Differently coloured glass	Selling in business parks instead of town centres

TYPES OF INNOVATION

- Numerous types of innovation:

Type of innovation	Example
Product innovation	The development of a new or improved product
Process innovation	The development of a new manufacturing process such as Pilkington's float glass process
Organisational innovation	A new venture division; a new internal communication system; introduction of a new accounting procedure
Management innovation	TQM (total quality management) systems; BPR (business process re-engineering); introduction of SAPR3*
Production innovation	Quality circles; just-in-time (JIT) manufacturing system; new production planning software, e.g. MRP II; new inspection system
Commercial/marketing innovation	New financing arrangements; new sales approach, e.g. direct marketing
Service innovation	Internet-based financial services

SAP is a German software firm and R3 is an Enterprise Resource Planning (ERP) product.

- Business model innovation - creation of a value proposition that offers to satisfy the same or different customer needs in new ways

TYPES OF INNOVATION

Product Innovations

- Improvements in existing products or creating entirely new products

Process Innovations

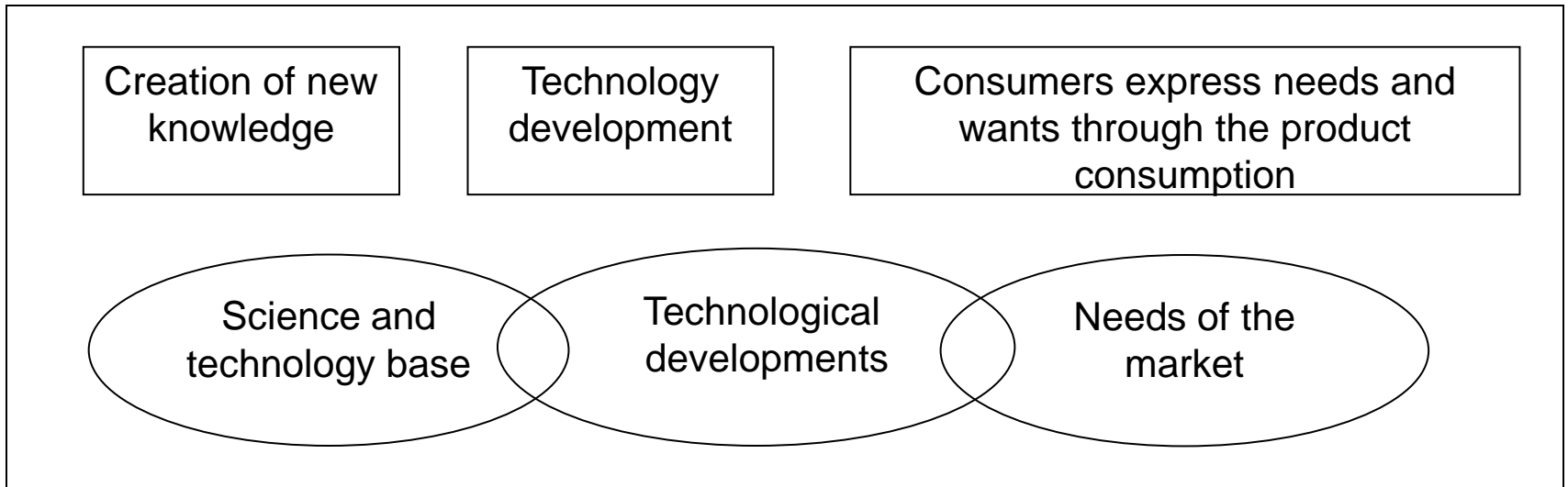- Involve changes in existing process or adopting a entirely new process

ELEMENTS OF SUCCESSFUL INNOVATION

▪ Main factors of innovation:

1. New knowledge creation (science base)

   ➢ Individual creativity, scientific research, basic principles and initial engineering of prototypes.

2. Technological development

   ➢ Resources, machines, labour and human skills.

3. Consumer needs

   ➢ General social needs and market forces.

ELEMENTS OF SUCCESSFUL INNOVATION

Creation of new knowledge	Technology development	Consumers express needs and wants through the product consumption

Science and technology base — Technological developments — Needs of the market

Absence of one or two of the elements will result in:

1. Innovation prematurity (leap)
   ➤ Example : Demand leap - absence of product idea and technological capability.

2. Innovation delay (lag)
   ➤ Example : Demand lag – absence of customer demand.

MODELS OF INNOVATION

- Innovation key activities have been represented by numerous different models.
- The chronological development of models of innovation:

Date	Model	Characteristics
1950/60s	Technology push	Simple linear sequential process; emphasis on R&D; the market is a recipient of the fruits of R&D
1970s	Market pull	Simple linear sequential process; emphasis on marketing; the market is the source for directing R&D; R&D has a reactive role
1980s	Coupling model	Emphasis on integrating R&D and marketing
1980/90s	Interactive model	Combinations of push and pull
2000s	Network model	Emphasis on knowledge accumulation and external linkages

Source: Based on R. Rothwell (1992) 'Successful industrial innovation: critical factors for the 1990s', *R&D Management*, Vol. 22, No. 3, 221–39.

Linear Innovation Model

- Viewed as sequence of separable stages or activities.
- 2 types:
  1) Technology Push
     - ✓ Scientists make unexpected discoveries, technologist develop product ideas and engineers produce prototypes for testing.
     - ✓ Manufacturing device ways to produce efficiently.
     - ✓ Marketing persuade potential consumer to accept product.
     - ✓ Marketplace was the passive recipient for the fruits of R & D.

Technology push

Research and development → Manufacturing → Marketing → User
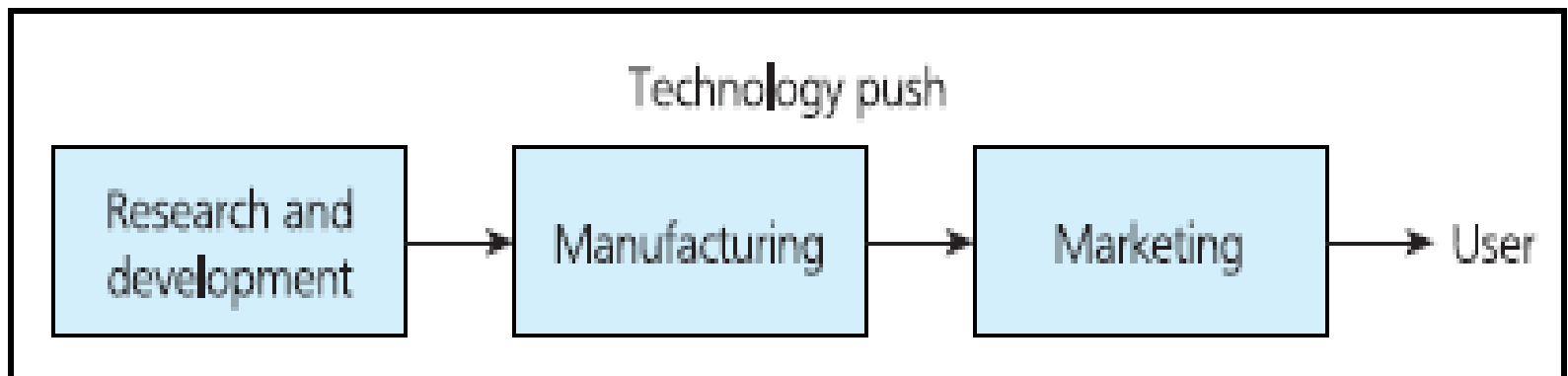
2) Market Pull

- ✓ Marketing - initiator of new ideas resulting from close interactions with customers.
- ✓ R&D - design and engineering and manufacturing -production.
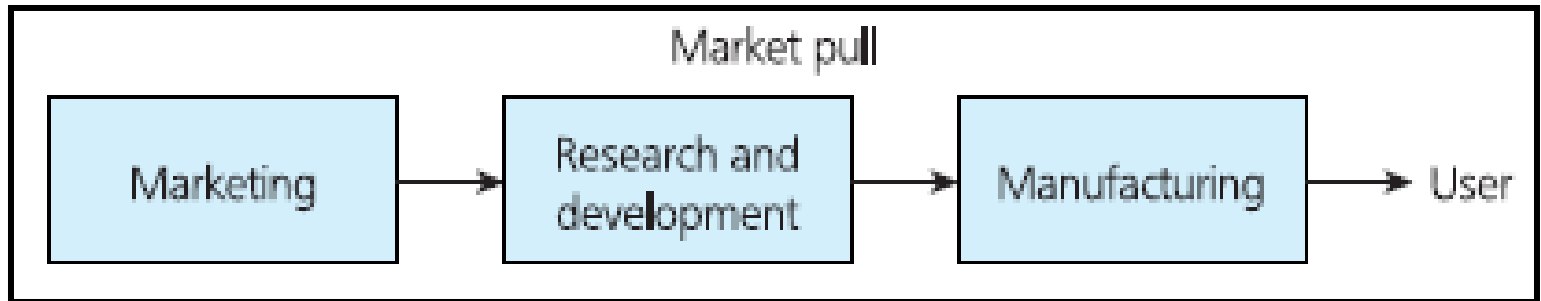
- ▪ Created 'over-the-wall' phenomenon:
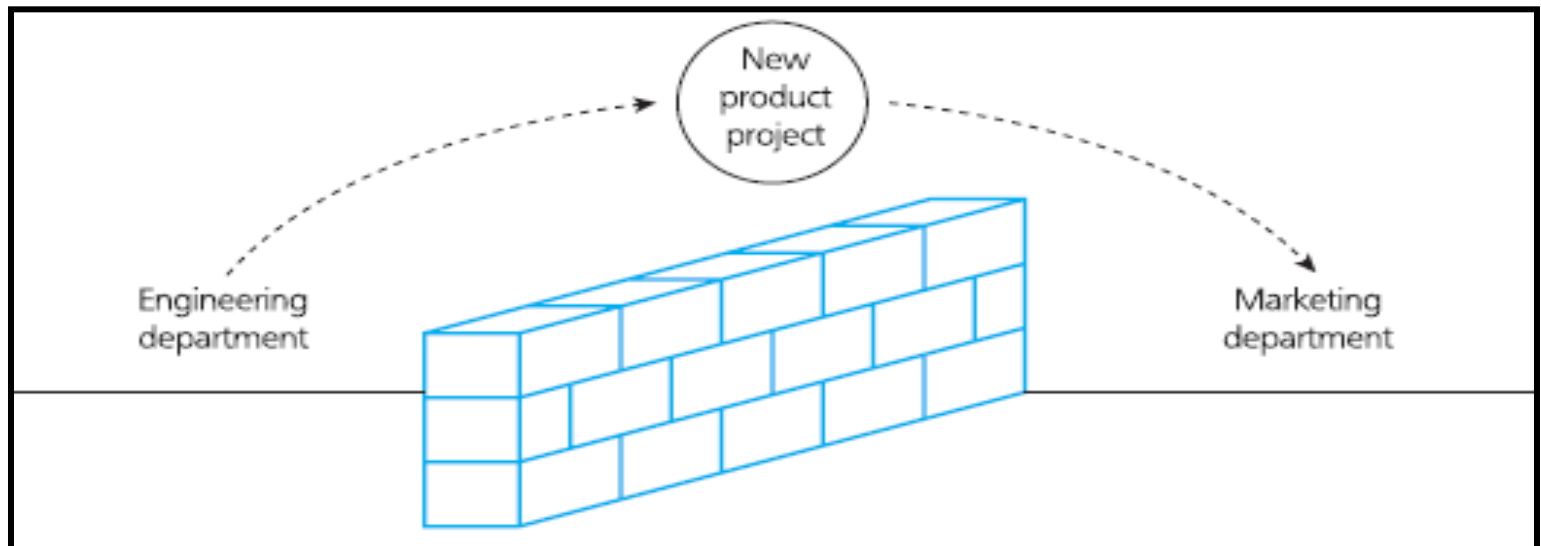
Combined Effect of Technology Push and Market Pull
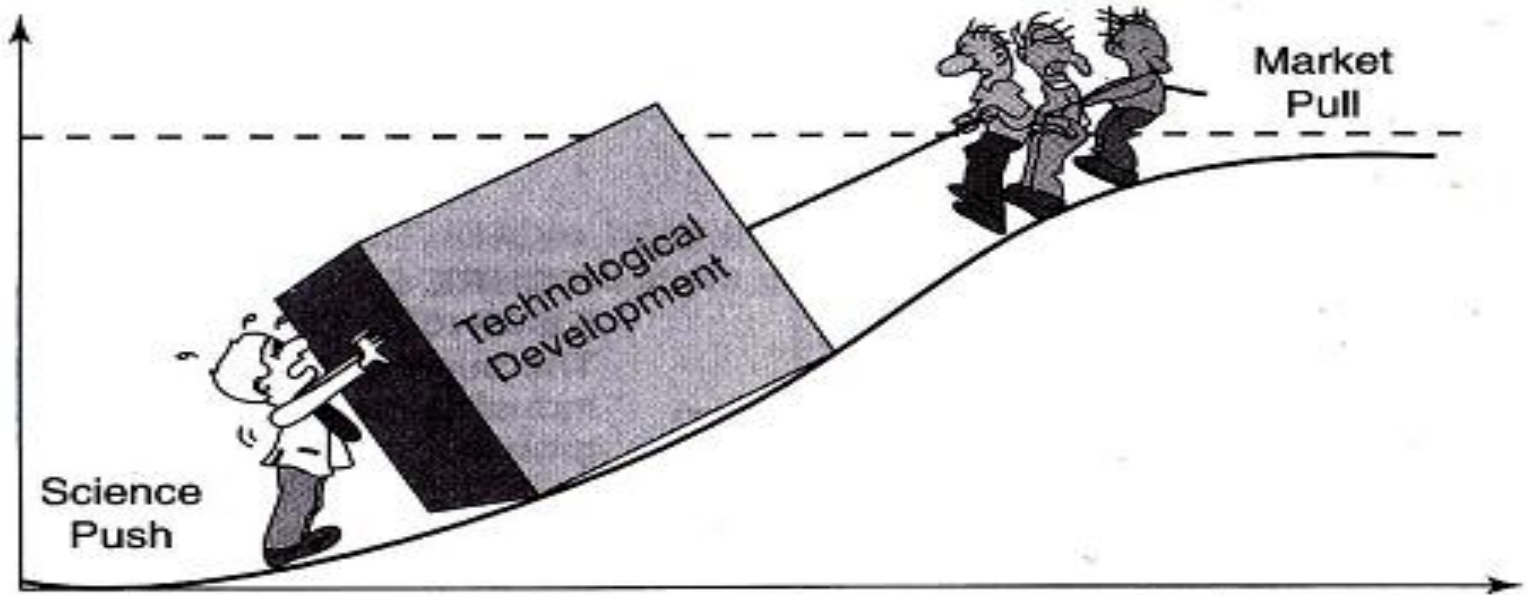
Weaknesses of Linear Model:

1. Time consuming since the activities are performed sequentially
2. Lose the process control as the idea is adapted in an isolated way
3. Problem of ownership or strategic responsibility for new products

Coupling Model
(Concurrent/Simultaneous Engineering)

- Emphasise the need for cross-functional approach.

- Simultaneous coupling of the knowledge within all three functions that will foster innovation.

- Focus the attention on the project as a whole involving all functions from the outset of the project.

- Introduces the need for project team.
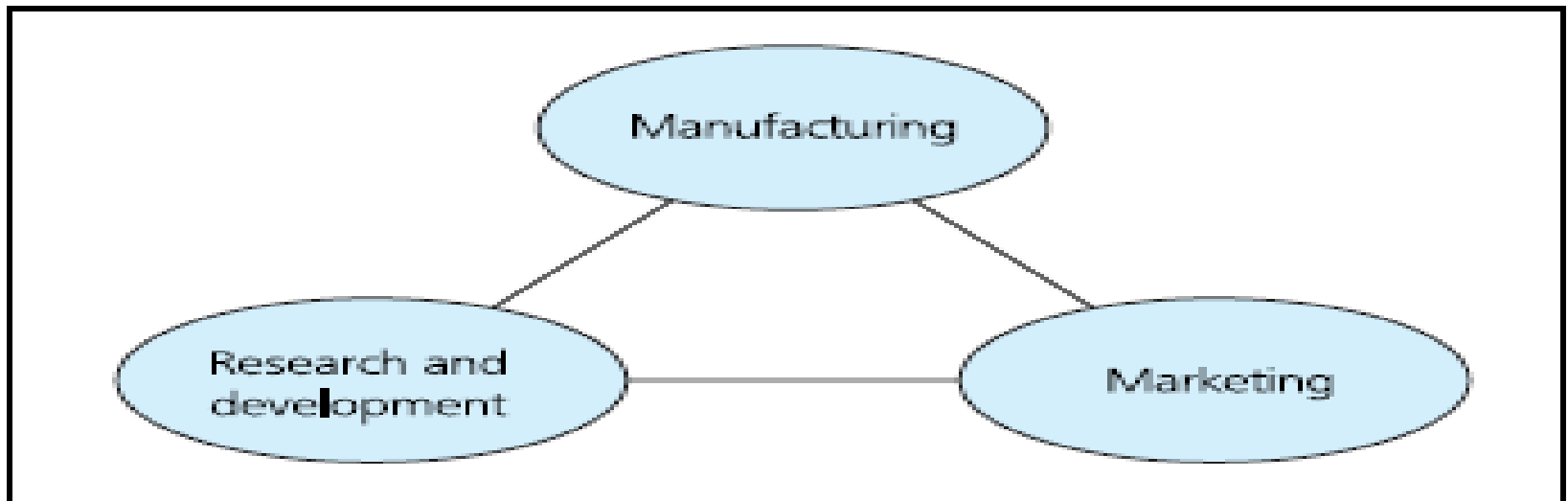
Interactive Model

- Links together the technology-push and market-pull models.

- Innovations occur as the result of the interaction of the marketplace, the science base and the organisation's capabilities.

- Complex set of communication paths (internal and external) over which knowledge is transferred.

- Provision for feedback among the main functional areas – R&D, manufacturing and marketing and technological development and marketplace.

- Inputs for generation of ideas:
    1. Organization capabilities
    2. Needs of the marketplace
    3. Science and technology base

Interactive Model
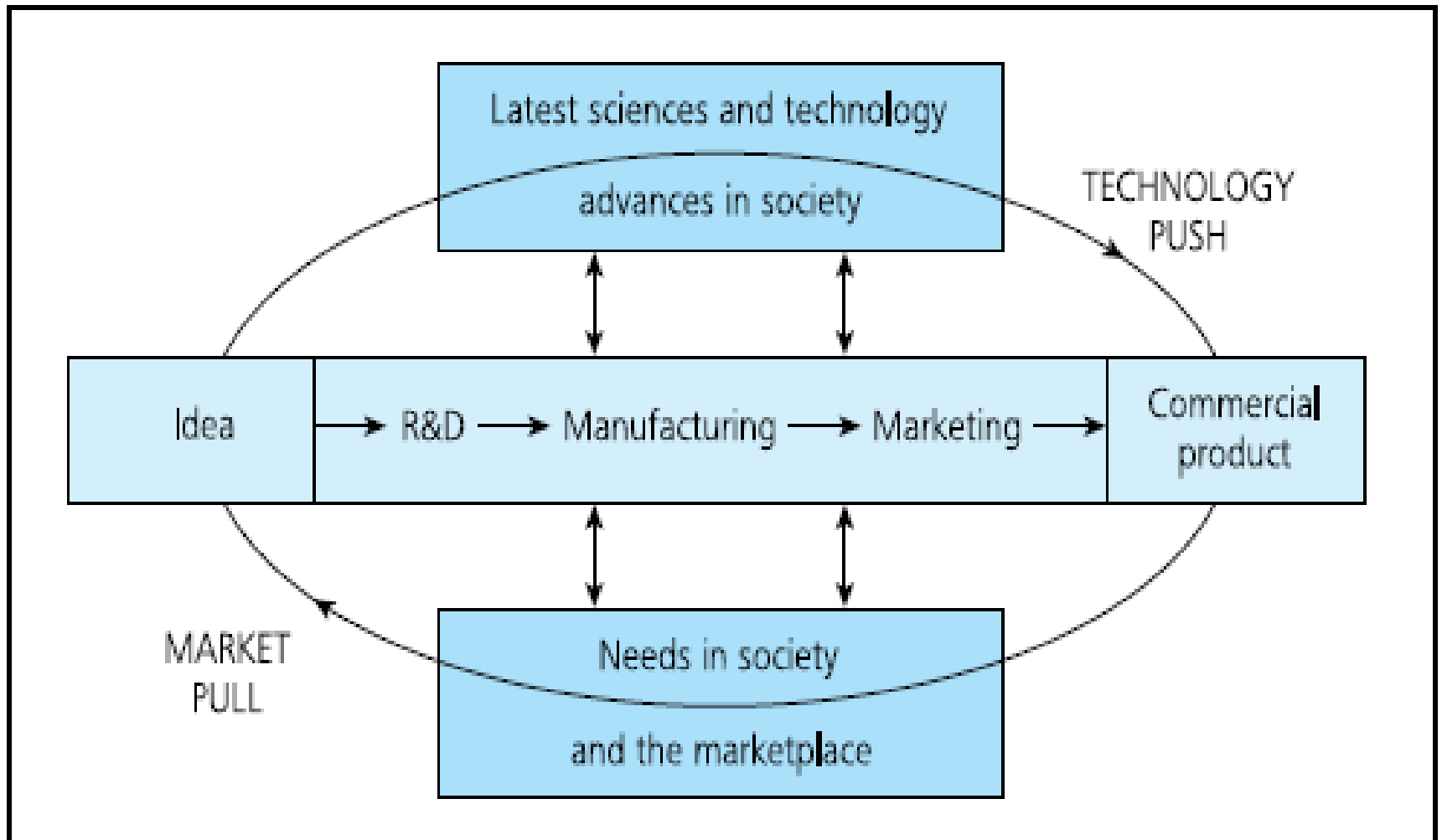
Network Model

- Represent the most recent thinking of innovation models.

- Stress the process of accumulation of knowledge gradually over time from a variety of different inputs (internal and external) from initial idea through product development.

- Emphasise the external linkages coupled with the internal activities.

- Lead to the use of wide variety of information inputs to produce products that best meet the market needs.

Network Model

External inputs:
societal needs
competitors
supplier partnerships
distributors
customers
strategic alliances

External inputs:
competitors
suppliers
distributors
customers

Marketing and sales

Finance

Accumulation of knowledge over time

Engineering and manufacturing

Research and development

External inputs:
competitors
suppliers
distributors
customers
university departments

External inputs:
scientific and technological developments
competitors
suppliers
customers
university departments

INNOVATION FRAMEWORK

INNOVATION FRAMEWORK

- A framework for a holistic approach to innovation.
- Five key areas that need to be aligned to innovation:

    1. Strategy and vision – ambitious view of where the company wants to be in the future.

    2. Leadership style – needs to support and encourage innovation

    3. Processes – enablers and can support a culture of innovation.

    4. Company culture – driven by leadership behavior and supported by the tools and offerings of the HR department.

    5. Work environment – supporting behaviors that are likely to lead to innovation.

- The 'outside' is important in 2 ways: understanding the wider context in which the company operates and linkages with the external entities.

INNOVATION STRATEGY DEVELOPMENT

Definitions and framing (why and what)

- **Situational analysis** – to understand the context for innovation within the organisation as well as the external environment.

- A clear link to company **vision and strategy** – how does innovation help us to achieve our ambition? Innovation is ultimately a means to help an organisation achieve its goals and ambitions.

- **Goals and objectives** – what we want to achieve through innovation.

- **Definition of innovation** (with types and levels); definitions are often organisation specific, they also help to create a shared language.

- Define **'focus areas for innovation'** (or **platforms/themes**) around which innovation should be focused (often tie in with trends or insights/deductions from trends).

Portfolio and structures (how)

- Approaches to **idea management** – where do we get our ideas from (internal/external), how do we collect, assess and manage them, who is reviewing and responding to them?

- Different dimensions and clusters of the **portfolio**, outlining in which innovation types/levels (innovation fields) the organisation plans to engage; how much of overall **resources** will be allocated to each innovation field; the result is highly organisation specific.

- What kind of **people and capabilities** do we need for each of the different innovation fields and how do we build this up over time? How do we recruit (for diversity), assess (for creativity, different team roles and skills, e.g. Belbin, MBTI, KAI, IDEO 10 faces of innovation etc. – see appendices), train, reward, remunerate, incentivise people (careful with financial rewards).

- **Metrics and measures of success**, varying and specific to the different innovation fields (see appendices for more).

- The **processes** through which innovation is managed, e.g. idea management, stage gate, prototyping, capturing and sharing **learnings** from success *and* failure.

- The **structures** through which innovation will be managed, e.g. innovation roles, reporting relationships and responsibilities, where and how decision making takes place.

- Information on how innovations (of different kinds) are **transferred into mainstream business.**

Creating a receptive and fertile ground

- A strategy for how **buy-in and involvement** will be assured, particularly among middle and senior managers

- Identifying aspects of **corporate culture** that help or hinder innovation, and how they might be migrated/changed over time.

- How the **physical work environment** be used to encourage and foster innovation.

FIRST MOVER VS FAST FOLLOWER

Product	Innovator	Follower	Winner
Jet airliner	De Haviland (Comet)	Boeing (707)	Follow
Plate glass	Pilkington	Corning	Lead
VCRs	AMpex/Sony	Matsushita/Panasonic	Follow
Diet cola	R.C. Cola	Coca-Cola	Follow
Instant camera	Polaroid	Kodak	Lead
Disposable nappy	Procter & Gamble	Kimberley-Clark	Lead
Paper copier	Xerox	Canon	?
Web browser	Netscape	Microsoft	Follow

Lab Task:

- Is it better to be a first mover or fast follower?
- List the advantages and disadvantages.

Concepts And Frameworks For Strategy Development

Porter's Five Forces : To help define starting point and understand the industry context.

Potential Entrants
Barriers to entry
- Economics of scale
- Product differentiation
- Capital requirements
- Switching costs
- Access to distribution channels
- Cost disadvantages independent of scale
- Government policy (regulation)

Supplier
Factors influencing suppliers' bargaining power
- Number of suppliers relative to buyers
- Availability of substitute products
- Importance of the product quality of supplier's product
- Importance of supplier's product to buyer
- Level of differentiation
- Profitability of supplier
- Supplier's ability to forward integrate

Industry Competitors
Rivalry among existing firms
Factors influencing rivalry
- Number of players
- Rate of industry growth
- Ratio of fixed to variable costs
- Level of product differentiation
- Excess capacity
- Exit barriers

Buyers
Factors influencing buyers' bargaining power
- Number of buyers relative to suppliers
- Cost of purchases relative to total costs
- Differentiation among offerings
- Profitability of buyers
- Buyers' ability to backward integrate
- Importance of the product quality of buyers' product
- Buyers access to information

Substitutes
To consider:
- Buyers propensity to substitute
- Relative price performance of substitutes

7S Framework to Innovation

Provide some insights for how companies can align their organization to an innovation ambition.

7S	To consider
Strategy	Should reflect the demands of future environment, and how the organisation plans to react to or change that environment to meet its needs; everything else must follow
Structure	Teams, innovation centres, lines for communication, alliances, idea evaluation
Systems	Align rewards and remuneration, management information systems, celebration of innovation and creativity, idea assessment beyond – financial evaluation, systems for implementing process, marketing, and management innovations
Style	Accepting of failure, suspending judgement, transformational leaders
Staff	Recruit creative people, develop innovation champions, train people, provide time for reflection, provide physical facilities
Shared values	Strategy determines the shared values; changing existing values will take time
Skills	Create opportunities, improve and innovate continuously, start knowledge management and organisational learning initiatives, invest in R&D

Source: Based on Higgins, J.M. (1996). A plan for innovation. *R&D Innovator*, **5**. Reproduced by permission of Innovative Leader.