

Basic concepts in innovation

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Economics of innovation

The importance of technological innovation

The growing importance of innovation ➤ globalization of markets.

Introducing new products helps firms protect their margins;

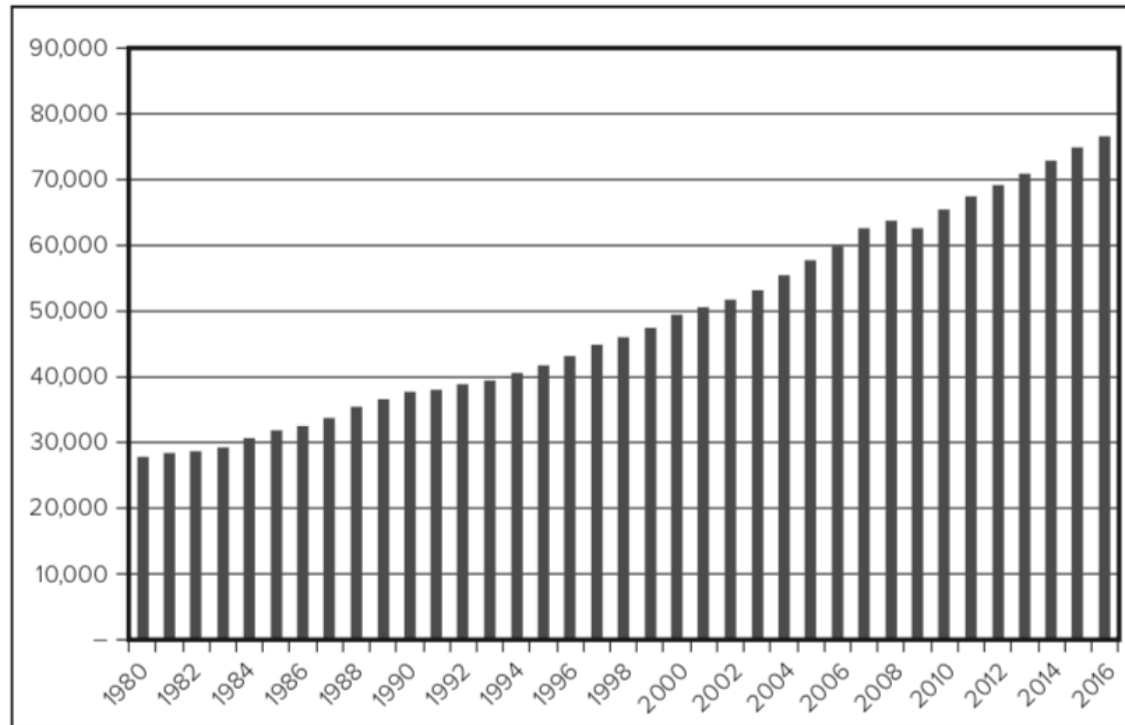
Investing in innovation process helps firms lower their costs.

Also advances in information technology have played a role in speeding the rhythm of innovation.

- These technologies help firms develop and produce more product variants that closely meet the needs of narrowly defined customer groups, thus achieving differentiation from competitors.

The impact of technological innovation on society

The aggregate impact of technological innovation can be observed by looking at **gross domestic product (GDP)**.



Externalities

Sometimes technological innovation results in negative **externalities**. Sometimes the knowledge related to the technological innovation is applied to problems hastily, without full consideration of the consequences and alternatives, but overall it will probably serve us better to have more knowledge than less.

- E.g. Production technologies may create pollution that is harmful to the surrounding communities;
 - agricultural and fishing technologies can result in erosion, elimination of natural habitats, and depletion of ocean stocks;
- E.g. medical technologies can result in unanticipated consequences such as antibiotic-resistant strains of bacteria or moral dilemmas regarding the use of genetic modification.

Scientists, Knowledge and Technology

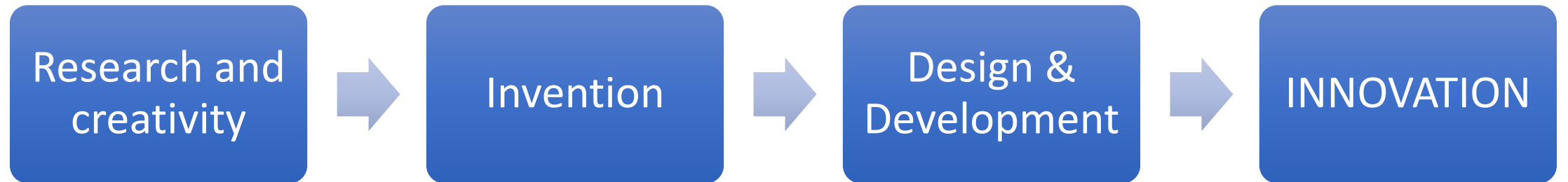
Scientists

- Discover knowledge by research
- Disseminate knowledge (open science?)
- Knowledge is public good(non-rival in use), hence created externalities
- Universities, government labs, some large firms
- It may represent the basis for technological advances

Technology

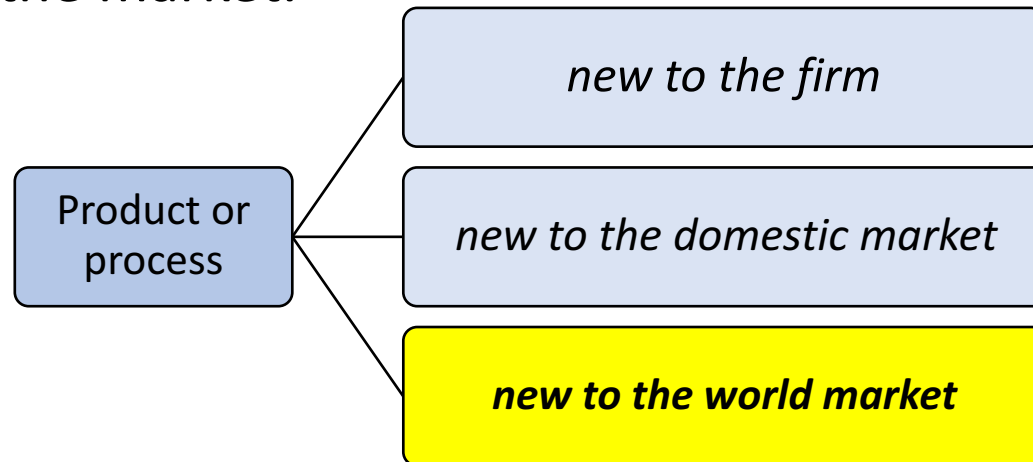
- Application of knowledge to 'production'
- Firms driven by profit incentive
- Private good: investment (R&D) projects, appropriate, use of intellectual property

A simple model of innovation

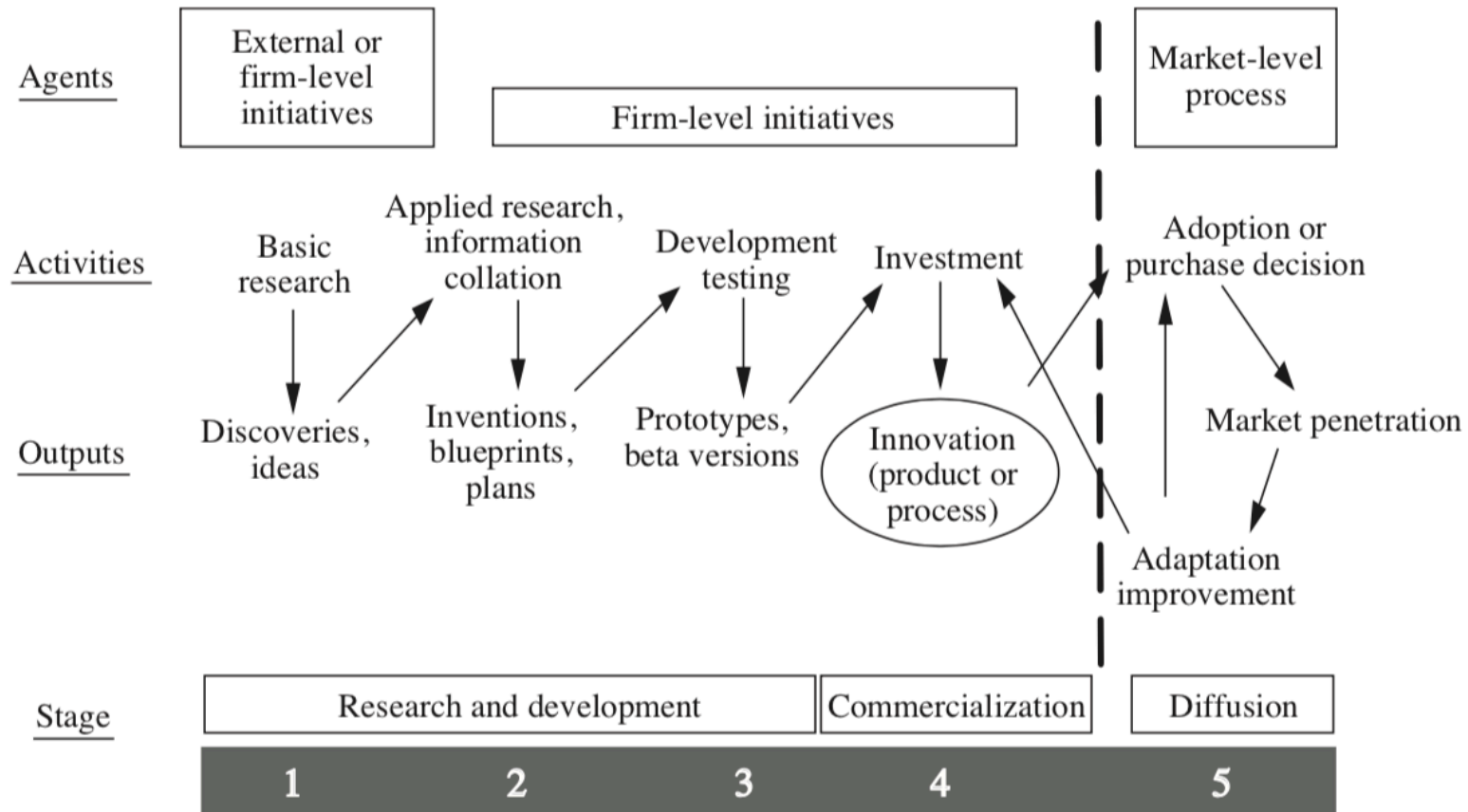


Innovation: an element of novelty

- Statement: Innovation is an element of novelty.
- Question: how much novelty is enough to identify any change as “innovation”?
- A key issue here is to distinguish innovation, the bringing to market of a truly novel item, from imitation, the adoption of a new technique or design that is already in the market.



The Stages of the Innovation Process



Incremental innovation vs *drastic* innovation

- *Incremental* innovation: makes a small change to an existing process or product.
- *Drastic or radical* innovation introduces a completely new type of production process with a wide range of applications and gives rise to a whole new genre of innovative products.

Product and process innovation

Two important distinctions in the innovation processes are:

- *Product innovation*: the introduction of a new product, or a significant qualitative change in an existing product.
- *Process innovation*: the introduction of a new process for making or delivering goods and services.

Product and process innovations

Product innovations

- product used by consumers
 - Microwaves, computers, mobile phones, etc
- Products used by firms
 - Shipping containers, computers, robots, etc

Process innovations

- Used by consumers
 - Fast food, air travel
- Used by firms
 - Assembly lines, software

Intellectual property rights

Intellectual property rights (IPRs), are the rights given to firms/persons over the creations of their inventions. They usually give the creator an exclusive right over the use of his creation for a certain period of time. Have evolved as a solution to free-market competition between firms.

The main formal methods of IP protection are:

- Patent
- Trademark
- Copyright

An example: The laser

The laser provides an interesting case study in invention and innovation.

Over the last fifty years lasers have found applications in a wide range of scientific, industrial, and consumer applications. Industrial applications include surveying, weaponry, and medicine. They are also the basic technology that allows bar code scanners, compact discs, and laser printers to work. Lasers are also central to the use of fiber optic cables to carry huge volumes of data across the Internet and between computers.

