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Chapter 02

Sources of Innovation

True / False Questions

1. If an individual knows a field too well, it can stifle his ability to come up with solutions that require an alternative perspective.

   True False

2. An organization's overall creativity level is a simple aggregate of the creativity of the individuals it employs.

   True False

3. Sometimes, monetary rewards undermine creativity by encouraging employees to focus on extrinsic rather than intrinsic motivation.

   True False

4. Innovation often originates with those who create solutions for their own needs.

   True False

5. The terms research and development represent different kinds of investment in innovation-related activities.

   True False

6. The science-push approach to research and development argued that innovation was driven by the perceived demand of potential users.

   True False

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7. Firms often form alliances with competitors to jointly work on an innovation project or to exchange information in pursuit of innovation.

   True False

8. Typically, the intellectual property policies of a university embrace both patentable and unpatentable innovations.

   True False

9. Incubators are regional districts, typically set up by government, to foster R&D collaboration between government, universities, and private firms.

   True False

10. The decline in the government share of spending on R&D is largely due to the rapid increase in industry R&D funding rather than a real decline in the absolute amount spent by the government.

    True False

11. Collaborative research is prohibited in high-technology sectors.

    True False

12. Knowledge that cannot be readily codified is called explicit knowledge.

    True False

13. Proximity and interaction can directly influence firms' ability and willingness to exchange knowledge.

    True False

14. Knowledge that is explicit requires more frequent and close interaction to be meaningfully exchanged than knowledge that is tacit.

    True False

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15. The degree to which innovative activities are geographically clustered is independent of the national differences in the way technology development is funded or protected.

    True False

Multiple Choice Questions

16. Erison Group, an advertising company, wants to hire someone as its creative head. Who among the following would be best suited for this position?

    A. An individual who completely adheres to the existing logic and paradigms and has extensive knowledge of the field
    B. An individual who has low tolerance for ambiguity and avoids taking risks
    C. An individual who has a moderate degree of knowledge of the field but is intrinsically motivated
    D. An individual who prefers to look at problems in conventional ways

17. Which of the following is a characteristic of most successful inventors?

    A. They specialize solely in a single field rather than several fields simultaneously.
    B. They are curious and more interested in solutions than in problems.
    C. They blindly accept the assumptions made in previous works in their field.
    D. They seek global solutions rather than local solutions.

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18. Which of the following is an example of user innovation?

A. Samuel has invented a detachable bicycle in order to make profits by selling it to a reputed bicycle manufacturing firm.
B. Sandra, an engineer, has developed a device that helps track the location of her teenage daughter's car.
C. Jessica, an ace designer for a clothing brand, has been asked to work on a dyeing technique that changes fabric color according to the room temperature.
D. Ivan, a scientist at a reputed pharmaceutical company, has developed an anti-inflammatory drug for the company to commercialize.

19. Which of the following is the correct sequence of steps for the science-push approach to research and development?

A. Customers express an unmet need, R&D develops the product to meet that need, the product is manufactured, and finally the marketing team promotes the product.
B. Scientific discovery leads to an invention, the engineering team designs the product, it is manufactured, and finally the marketing team promotes it.
C. Marketing discovers a need, R&D comes up with the product concept that is refined by engineering, the manufacturing team produces it, and finally the product is sold.
D. Manufacturing sees a way to improve a product, the engineering team redesigns it, and finally the marketing team creates awareness about the improved product.

20. Breaking Ventures Inc. realized that most parents are worried about their teenage children going out on their own. Based on this information, the company developed a device that could be fixed into teenagers' cell phones, and it helped parents keep track of their children's location. This approach to research and development is referred to as _____.

A. demand-pull
B. supply-push
C. science-push
D. research-pull

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21. The demand-pull approach to research and development refers to research and development that:

A. focuses on developing products that are expected to increase demand in a particular market segment.
B. begins by examining the outcomes of the firm's basic research and the potential commercial applications that may be constructed from those outcomes.
C. focuses on developing products that are expected to decrease the demand for their substitute products.
D. originates as a response to the specific problems or suggestions of customers.

22. Organizations that manufacture products such as light bulbs for lamps or DVDs for DVD players are examples of _____.

A. moderators
B. lead users
C. complementors
D. incubators

23. _____ is the ability of an organization to recognize, assimilate, and utilize new knowledge.

A. Cognitive dissonance
B. Absorptive capacity
C. Organizational obsolescence
D. Built-in obsolescence

24. The president of Mountain Home University has been asked by the board of trustees to set up a separate unit to facilitate the commercialization of technology developed by the research students at the university. Such a unit is typically called a _____.

A. strategic business unit
B. commercialization office
C. technology transfer office
D. science park

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25. Which of the following statements is true about the Bayh-Dole Act of 1980?

A. It made university technology transfer activities illegal and unethical.
B. It allowed universities to collect royalties on inventions funded with taxpayer dollars.
C. It restricted provision of patents for inventions developed at universities.
D. It made investment in research and technology mandatory for public companies.

26. Regional districts, typically set up by government, to foster R&D collaboration between government, universities, and private firms are called _____.

A. technological trajectories
B. free trade areas
C. complementors
D. science parks

27. In 2001, Shanghai's municipal government set aside 13 square kilometers of land near the Huangpu River for university laboratories and start-up firms in microelectronics, digital technology, and life sciences. The project aimed to foster research in microelectronics, the development of a technologically advanced labor pool, and the creation of new industries in Shanghai. This project would be best termed a _____.

A. complementor
B. strategic unit
C. science park
D. free trade area

28. Institutions designed to nurture the development of new businesses that might otherwise lack access to adequate funding or advices are called _____.

A. complementors
B. research collaboration offices
C. incubators
D. technology clusters

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29. Which of the following is true of interfirm collaborative research and development networks?

A. Collaborative research networks are not important or viable in high-technology sectors.
B. Interfirm networks can enable firms to achieve much more than they could achieve individually.
C. The flow of information and other resources through a network is independent of the network's size.
D. Information diffusion is fairly slow and limited in collaborative research networks with dense structures and many paths for information to travel.

30. _____ are regional groups of firms that have a connection to a common technology and may engage in buyer, supplier, and complementor relationships, as well as research collaboration.

A. Technology transfer offices
B. Technology incubators
C. Strategic business units
D. Technology clusters

31. Which of the following statements is true of geographical clustering?

A. The proximity of many competitors serving a local market leads to competition that increases their pricing power in their relationships with both buyers and suppliers.
B. Close proximity of firms eliminates the likelihood of a firm's competitors gaining access to the firm's proprietary knowledge.
C. Clustering invariably leads to lower concentration of pollution and inordinately low housing costs.
D. Proximate firms have an advantage in sharing information that can lead to greater innovation productivity.

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32. The benefits firms reap by locating in close geographical proximity to each other are known collectively as _____.

A. agglomeration economies
B. incubator economies
C. virtual economies
D. shadow economies

33. _____ are individuals or organizations that transfer information from one domain to another in which it can be usefully applied.

A. Knowledge brokers
B. Incubation workers
C. Complementors
D. Category captains

34. _____ is a positive externality from R&D resulting from the spread of knowledge across organizational or regional boundaries.

A. Technological discombobulation
B. Technological determinism
C. Technological spillover
D. Technological dissonance

35. A variety of rice created by Biocrop Inc. through recombinant DNA technology was found to be rich in both carbohydrates and proteins. After the success of this rice variety, recombinant DNA technology was implemented by less-developed countries to increase the nutrient levels of fruits, pulses, and greens in order to feed their malnourished children. This is an example of _____.

A. technological dissonance
B. technological spillover
C. technological retardation
D. technological determinism

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Essay Questions

36. What are the most important intellectual abilities for creative thinking? What is the impact of knowledge on creativity?

37. Explain the terms basic research and applied research.

38. In the context of government-funded research, explain the term incubator.

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39. What are some of the downsides to geographical clustering?

40. Explain the concept of technology spillovers. What are the factors affecting the likelihood of technological spillovers?

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Chapter 02 Sources of Innovation Answer Key

True / False Questions

1. (p. 20) If an individual knows a field too well, it can stifle his ability to come up with solutions that require an alternative perspective.

TRUE

Difficulty: 1 Easy

2. (p. 20) An organization's overall creativity level is a simple aggregate of the creativity of the individuals it employs.

FALSE

Difficulty: 1 Easy

3. (p. 21) Sometimes, monetary rewards undermine creativity by encouraging employees to focus on extrinsic rather than intrinsic motivation.

TRUE

Difficulty: 1 Easy

4. (p. 24) Innovation often originates with those who create solutions for their own needs.

TRUE

Difficulty: 1 Easy

5. (p. 26) The terms research and development represent different kinds of investment in innovation-related activities.

TRUE

Difficulty: 1 Easy

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6. The science-push approach to research and development argued that innovation was driven by the perceived demand of potential users. *(p. 27)*

FALSE

Difficulty: 1 Easy

7. Firms often form alliances with competitors to jointly work on an innovation project or to exchange information in pursuit of innovation. *(p. 27)*

TRUE

Difficulty: 1 Easy

8. Typically, the intellectual property policies of a university embrace both patentable and unpatentable innovations. *(p. 29)*

TRUE

Difficulty: 1 Easy

9. Incubators are regional districts, typically set up by government, to foster R&D collaboration between government, universities, and private firms. *(p. 29)*

FALSE

Difficulty: 1 Easy

10. The decline in the government share of spending on R&D is largely due to the rapid increase in industry R&D funding rather than a real decline in the absolute amount spent by the government. *(p. 29)*

TRUE

Difficulty: 1 Easy

11. Collaborative research is prohibited in high-technology sectors. *(p. 32)*

FALSE

Difficulty: 1 Easy

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12. Knowledge that cannot be readily codified is called explicit knowledge.
(p. 35)

FALSE

Difficulty: 1 Easy

13. Proximity and interaction can directly influence firms' ability and willingness to exchange knowledge.
(p. 35)

TRUE

Difficulty: 1 Easy

14. Knowledge that is explicit requires more frequent and close interaction to be meaningfully exchanged than knowledge that is tacit.
(p. 35)

FALSE

Difficulty: 1 Easy

15. The degree to which innovative activities are geographically clustered is independent of the national differences in the way technology development is funded or protected.
(p. 36)

FALSE

Difficulty: 1 Easy

Multiple Choice Questions

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16. Erison Group, an advertising company, wants to hire someone as its creative head. Who among the following would be best suited for this position?
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B. An individual who has low tolerance for ambiguity and avoids taking risks
C. An individual who has a moderate degree of knowledge of the field but is intrinsically motivated
D. An individual who prefers to look at problems in conventional ways

Difficulty: 3 Hard

17. Which of the following is a characteristic of most successful inventors?
(p. 23)

A. They specialize solely in a single field rather than several fields simultaneously.
B. They are curious and more interested in solutions than in problems.
C. They blindly accept the assumptions made in previous works in their field.
D. They seek global solutions rather than local solutions.

Difficulty: 2 Medium

18. Which of the following is an example of user innovation?
(p. 26)

A. Samuel has invented a detachable bicycle in order to make profits by selling it to a reputed bicycle manufacturing firm.
B. Sandra, an engineer, has developed a device that helps track the location of her teenage daughter's car.
C. Jessica, an ace designer for a clothing brand, has been asked to work on a dyeing technique that changes fabric color according to the room temperature.
D. Ivan, a scientist at a reputed pharmaceutical company, has developed an anti-inflammatory drug for the company to commercialize.

Difficulty: 3 Hard

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19. *(p. 27)* Which of the following is the correct sequence of steps for the science-push approach to research and development?

A. Customers express an unmet need, R&D develops the product to meet that need, the product is manufactured, and finally the marketing team promotes the product.
B. Scientific discovery leads to an invention, the engineering team designs the product, it is manufactured, and finally the marketing team promotes it.
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D. Manufacturing sees a way to improve a product, the engineering team redesigns it, and finally the marketing team creates awareness about the improved product.

Difficulty: 2 Medium

20. *(p. 27)* Breaking Ventures Inc. realized that most parents are worried about their teenage children going out on their own. Based on this information, the company developed a device that could be fixed into teenagers' cell phones, and it helped parents keep track of their children's location. This approach to research and development is referred to as _____.

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B. supply-push
C. science-push
D. research-pull

Difficulty: 3 Hard

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21. The demand-pull approach to research and development refers to research and development that:
(p. 27)

A. focuses on developing products that are expected to increase demand in a particular market segment.
B. begins by examining the outcomes of the firm's basic research and the potential commercial applications that may be constructed from those outcomes.
C. focuses on developing products that are expected to decrease the demand for their substitute products.
D. originates as a response to the specific problems or suggestions of customers.

Difficulty: 2 Medium

22. Organizations that manufacture products such as light bulbs for lamps or DVDs for DVD players are examples of _____.
(p. 27)

A. moderators
B. lead users
C. complementors
D. incubators

Difficulty: 1 Easy

23. _____ is the ability of an organization to recognize, assimilate, and utilize new knowledge.
(p. 28)

A. Cognitive dissonance
B. Absorptive capacity
C. Organizational obsolescence
D. Built-in obsolescence

Difficulty: 1 Easy

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24. *(p. 29)* The president of Mountain Home University has been asked by the board of trustees to set up a separate unit to facilitate the commercialization of technology developed by the research students at the university. Such a unit is typically called a _____.

A. strategic business unit
B. commercialization office
C. technology transfer office
D. science park

Difficulty: 2 Medium

25. *(p. 29)* Which of the following statements is true about the Bayh-Dole Act of 1980?

A. It made university technology transfer activities illegal and unethical.
B. It allowed universities to collect royalties on inventions funded with taxpayer dollars.
C. It restricted provision of patents for inventions developed at universities.
D. It made investment in research and technology mandatory for public companies.

Difficulty: 2 Medium

26. *(p. 29)* Regional districts, typically set up by government, to foster R&D collaboration between government, universities, and private firms are called _____.

A. technological trajectories
B. free trade areas
C. complementors
D. science parks

Difficulty: 1 Easy

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27. *(p. 29)* In 2001, Shanghai's municipal government set aside 13 square kilometers of land near the Huangpu River for university laboratories and start-up firms in microelectronics, digital technology, and life sciences. The project aimed to foster research in microelectronics, the development of a technologically advanced labor pool, and the creation of new industries in Shanghai. This project would be best termed a _____.

A. complementor
B. strategic unit
C. science park
D. free trade area

Difficulty: 3 Hard

28. *(p. 29)* Institutions designed to nurture the development of new businesses that might otherwise lack access to adequate funding or advices are called _____.

A. complementors
B. research collaboration offices
C. incubators
D. technology clusters

Difficulty: 1 Easy

29. *(p. 32)* Which of the following is true of interfirm collaborative research and development networks?

A. Collaborative research networks are not important or viable in high-technology sectors.
B. Interfirm networks can enable firms to achieve much more than they could achieve individually.
C. The flow of information and other resources through a network is independent of the network's size.
D. Information diffusion is fairly slow and limited in collaborative research networks with dense structures and many paths for information to travel.

Difficulty: 2 Medium

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30. _____ are regional groups of firms that have a connection to a common technology and may engage in buyer, supplier, and complementor relationships, as well as research collaboration.
(p. 34)

A. Technology transfer offices
B. Technology incubators
C. Strategic business units
D. Technology clusters

Difficulty: 1 Easy

31. Which of the following statements is true of geographical clustering?
(p. 34)

A. The proximity of many competitors serving a local market leads to competition that increases their pricing power in their relationships with both buyers and suppliers.
B. Close proximity of firms eliminates the likelihood of a firm's competitors gaining access to the firm's proprietary knowledge.
C. Clustering invariably leads to lower concentration of pollution and inordinately low housing costs.
D. Proximate firms have an advantage in sharing information that can lead to greater innovation productivity.

Difficulty: 2 Medium

32. The benefits firms reap by locating in close geographical proximity to each other are known collectively as _____.
(p. 35)

A. agglomeration economies
B. incubator economies
C. virtual economies
D. shadow economies

Difficulty: 1 Easy

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33. _____ are individuals or organizations that transfer information from one domain to another in which it can be usefully applied. *(p. 36)*

A. Knowledge brokers
B. Incubation workers
C. Complementors
D. Category captains

Difficulty: 1 Easy

34. _____ is a positive externality from R&D resulting from the spread of knowledge across organizational or regional boundaries. *(p. 37)*

A. Technological discombobulation
B. Technological determinism
C. Technological spillover
D. Technological dissonance

Difficulty: 1 Easy

35. A variety of rice created by Biocrop Inc. through recombinant DNA technology was found to be rich in both carbohydrates and proteins. After the success of this rice variety, recombinant DNA technology was implemented by less-developed countries to increase the nutrient levels of fruits, pulses, and greens in order to feed their malnourished children. This is an example of _____. *(p. 37)*

A. technological dissonance
B. technological spillover
C. technological retardation
D. technological determinism

Difficulty: 3 Hard

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Essay Questions

36. What are the most important intellectual abilities for creative thinking? What is the impact of knowledge on creativity?
(p. 20)

An individual's creative ability is a function of his or her intellectual abilities, knowledge, style of thinking, personality, motivation, and environment. The most important intellectual abilities for creative thinking include the ability to look at problems in unconventional ways, the ability to analyze which ideas are worth pursuing and which are not, and the ability to articulate those ideas to others and convince others that the ideas are worthwhile. The impact of knowledge on creativity is somewhat double-edged. If an individual has too little knowledge of a field, he or she is unlikely to understand it well enough to contribute meaningfully to it. On the other hand, if an individual knows a field too well, that person can become trapped in the existing logic and paradigms, preventing him or her from coming up with solutions that require an alternative perspective. Thus, an individual with only a moderate degree of knowledge of a field might be able to produce more creative solutions than an individual with extensive knowledge of the field.

Difficulty: 2 Medium

37. Explain the terms basic research and applied research.
(p. 26)

Basic research is effort directed at increasing understanding of a topic or field without a specific immediate commercial application in mind. This research advances scientific knowledge, which may (or may not) turn out to have long-run commercial implications. Applied research is directed at increasing understanding of a topic to meet a specific need. In industry, this research typically has specific commercial objectives.

Difficulty: 2 Medium

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38. In the context of government-funded research, explain the term incubator.

(p. 29-31)

An incubator is an institution designed to nurture the development of new businesses that might otherwise lack access to funding or advice. It allows companies to share costs and resources until they can stand on their own. Incubators help overcome the market failure that can result when a new technology has the potential for important societal benefits, but its potential for direct returns is highly uncertain.

Difficulty: 2 Medium

39. What are some of the downsides to geographical clustering?

(p. 35)

There are some downsides to geographical clustering. First, the proximity of many competitors serving a local market can lead to competition that reduces their pricing power in their relationships with both buyers and suppliers. Second, close proximity of firms may increase the likelihood of a firm's competitors gaining access to the firm's proprietary knowledge. Third, clustering can potentially lead to traffic congestion, inordinately high housing costs, and higher concentrations of pollution.

Difficulty: 2 Medium

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40. *(p. 37)* Explain the concept of technology spillovers. What are the factors affecting the likelihood of technological spillovers?

Technological spillovers are a positive externality from R&D resulting from the spread of knowledge across organizational or regional boundaries. Technology spillovers are a significant influence on innovative activity. Whether R&D benefits will spill over is partially a function of the strength of protection mechanisms such as patents, copyrights, and trade secrets. Since the strength of protection mechanisms varies significantly across industries and countries, the likelihood of spillovers varies also. The likelihood of spillovers is also a function of the nature of the underlying knowledge base and the mobility of the labor pool.

Difficulty: 2 Medium

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