

**HELSINKI UNIVERSITY OF TECHNOLOGY  
INSTITUTE OF STRATEGY AND INTERNATIONAL BUSINESS**

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Course: TU-91.2005 Strategic Management of Technology and Innovation  
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Student number : \_\_\_\_\_

University: \_\_\_\_\_

Year you followed the course \_\_\_\_\_

Check the number of pages your exam paper  
(this document) has and verify the number here \_\_\_\_\_

Please write your name, student number, course code and name, this date and your signature on each additional paper you use for answering the case questions. Use clear handwriting. You can answer the questions either in English, Finnish or Swedish. You have to get at least 25 points (out of 50) to pass the examination.

**A. TRUE-FALSE QUESTIONS (max 15 points)**

Note: There is only 1 correct answer to each true-false question. The questions are evaluated as follows:

- wrong answer: -1 point
- no answer: 0 points
- correct answer: +1 point

1. Innovation can be characterized as an invention that has been put into commercial use.

TRUE

FALSE

2. In the market pull-model of innovation lead users plays a key role in guiding research and development work and testing new technologies

TRUE

FALSE

3. An architectural innovation entails changing or new interaction with existing components of a technology

TRUE

FALSE

4. Teece (1984) defines complementary assets that are generic as general purpose assets which do not need to be tailored to the innovation in question

TRUE

FALSE

5. The chasm represents a phase of low revenues for organizations that can prove to be fatal between technology enthusiast and early majority users of a technology

TRUE

FALSE

6. Firms should always aim to be a first mover around a new technological format due to the invaluable benefits of e.g. generating switching costs of users  
 TRUE  
 FALSE
7. Technological interrelatedness is a key source to increasing returns to adoption of a technology  
 TRUE  
 FALSE
8. When customer requirements for network externality value are satiated at lower levels of market share, more than one dominant design may thrive  
 TRUE  
 FALSE
9. In positive feedback industry competition is between technology paradigms  
 TRUE  
 FALSE
10. Direct network effects refers to the type of network externalities of a good generated in complementary goods or post-purchase services  
 TRUE  
 FALSE
11. Platform projects typically offer fundamental improvements in the cost, quality, and performance of a technology over preceding generations  
 TRUE  
 FALSE
12. Strategic dissonance emerges from divergence of the basis of competition and firm distinctive competences  
 TRUE  
 FALSE
13. Autonomous strategic action is typically associated with internal R&D  
 TRUE  
 FALSE
14. In a heavyweight team structure project managers provides cross-functional integration where team members are collocated but still report to functional managers also  
 TRUE  
 FALSE
15. Absorptive capacity refers to the ability of firm top management to recognize value of new, internally developed knowledge, assimilate it, and internalize it by reorganizing organizational structures to support innovation capabilities and the development of new business  
 TRUE  
 FALSE

**B. MULTIPLE CHOICE QUESTIONS (max 10 points)**

Choose only one alternative per question. There is only 1 correct answer to each question. The responses are evaluated as follows:

- wrong answer(s): 0
- no answer: 0
- correct answer: +1

**OBS: The questions 4,6,8,9,10 where wrongly formulated (without the NOT). This confused many. Thus we accepted all answers as correct.**

1. Which of the following does not represent a radical innovation?
  - a. The mobile phone
  - b. Mobile TV
  - c. The CD
  - d. The Blue-Ray Disc

ANSWER: \_\_\_d
  
2. Success factors for firms in pre-dominant design situations are NOT:
  - a. Develop multiple approaches
  - b. Let design float
  - c. Use generic assets (low cost) assets
  - d. Listen to market
  - e. Price

ANSWER: \_\_\_e
  
3. Which of the following is not representative as an illustration of a technological trajectory
  - a. Moore's 1<sup>st</sup> Law
  - b. The evolution of combustion engine liter/100 km ratio
  - c. Evolution of the user base of mobile telephones
  - d. The developments in size of wind turbine blades

ANSWER: \_\_\_c
  
4. Incumbents often fails to react to disruptive technologies due to that:
  - a. the innovation performs poorly
  - b. it costs more
  - c. the firms R&D department lacks resources
  - d. customers do not want it
  - e. the firms is more profitable without it

ANSWER: \_\_\_ The question lacked the NOT. Thus a,b,d and e are correct.
  
5. Which of the following are NOT properties of technology related externalities
  - a. Technological change is often non-predictive
  - b. Increasing learning costs around a technology
  - c. Inefficient technologies may be selected as dominant designs
  - d. Technological design becomes often increasingly inflexible
  - e. Small historical events may prove decisive

ANSWER: \_\_\_ b
  
6. Keystone strategy is one of the four types of ecosystem strategies described by lansiti & Levien (2004). A keystone strategy includes:
  - a. Control critical assets
  - b. Provide system coordination
  - c. Specialize on specialized skill or competence
  - d. Share value

ANSWER: \_\_\_ The question lacked the NOT. Thus a, b and d are correct

7. It is important for firms to integrate and locate themselves into industrial clusters because of the benefits of
- high-quality transportation infrastructure
  - elimination of competitive pressures for advancing innovation
  - the availability of well-educated employees
  - delaying large commitments

ANSWER: \_\_\_ b

8. Discovery driven planning refers to an approach that supports:
- risk reduction of big initial investments in production of new technology
  - the conversion of assumptions to knowledge
  - identification of key metrics of a new technology
  - a reverse income statement

ANSWER: \_\_\_ The question lacked the NOT. Thus b, c and d where correct.

9. Core competencies of a firm refers to properties of knowledge and know-how of a firm that
- are a significant source of competitive differentiation
  - covers a range of businesses
  - are patented and copyrighted
  - are hard for competitors to imitate

ANSWER: \_\_\_ The question lacked the NOT. Thus a,b, and d where correct.

10. To get most value from new high tech ventures, a firm should evaluate the following options and strategies as commercialization paths:
- Killing the venture
  - Salvaging
  - Recycling of venture
  - Launching
  - Long term strategic planning

ANSWER: \_\_\_ The question lacked the NOT. Thus a, b, c, and d where correct

C. OPEN-END QUESTIONS (max 25 points)

Mini case: NutraSweet

Read the 8 page article and fact compilation about NutraSweet and Searle and present your analysis within the scope of the questions. Use additional paper if necessary for answering.

1. What was the basis of the tight appropriability regime that Searle managed to develop? (5p)

Issues and points to cover

**Appropriability.** Appropriability depends on a) The nature of technology (tacitness, complexity, codified, systemicity, and **product-process nature**) and b) efficacy of legal mechanisms of protection (patents, copyrights, trade secrets).

Topics to cover

- Nature of technology and the efficacy of legal mechanisms resulted in a tight appropriability regime
- Searle had a strong background (tacit knowledge) in chemical science, process industries, medical products – describe the nature of technology and the properties (time and needed investments) of R&D
- Searle had a strong presence in the US market, as well as significant financial assets – bulk product and near monopolistic market often ensues
- Trademark (copyright)
- Searle managed to establish an exceptionally tight appropriability regime around NutraSweet with patents and FDA approvals
- U.S. patent protection was obtained in 1970, also patenting in Japan, Canada, Australia, the UK, France and Germany
- However, despite patent, was unable to achieve the FDA license required for human consumption until 1981
- In 1984, successfully pushed for special legislation to extend patent for five more years in U.S. and U.K
- Searle was well connected with US political circles, as manifested by its ability to hire Donald Rumsfeld, who had served as Chief of Staff to the Nixon Administration and had survived the WaterGate scandal to serve in Ford's administration
- Rumsfeld was able to rapidly establish a strong appropriability regime for Aspartame (through FDA approval), before moving on to marketing other chemical compounds under the Reagan administration...

2. How did the related industries evolve around the created tight appropriability regime in the sweetener business? (5 points)

**Topics to cover**

- Used strong appropriability to contract process capacity
- Analysis of how complementary assets developed. Complementary assets should be analyzed by a) describing the business model with sweeteners (external analysis) b) own asset audit - Are they generic, specialized or co-specialized?
- Immediately started to use established alliances to develop own process competencies
- Developed process technologies so as to reap economies of scale (learning curve)
- Played suppliers so that none was able to learn the technology too well
- Started an exceptionally aggressive marketing campaign to establish brand recognition and related commercial assets
- 30 MUSD in marketing (as opposed to 3,5 MUSD to alternative sweeteners)
- 40% discounts if customers used the NutraSweet logo on their products
- 'Meet-or-release' and 'favored-nation' clauses used to tie customers globally to NutraSweet
- As competition appeared, slashed prices very aggressively (possible because of process improvements) – also, signaled willingness to fight to preserve market share

3. How could the patent expiration in 1992 be managed in terms of sustaining competitive business in sweeteners? (5 points)

Here one should evaluate how Searle may control critical assets, provide system coordination, and share value for system evolution and control around the sweetener business. This implies controlling systemically central, hard-to-copy, value-adding resources that lend themselves for complementarities. Another critical issue is to provide coordination and guidance for the rest of the system. Coordination of efforts includes synchronization of development activities and definition of systemic interfaces.

**Points to cover**

- The expiring of patents led Searle to strengthen position in complementary assets
- Establish **trademarks** to enhance brand recognition
- **Joint venture** with Ajinomoto on production of biochemical agents – techniques for distillation and synthesis of hydrocarbon compounds – manufacturing assets
- **Avoiding renewal of contracts** with suppliers after they expired
- **Developing own process competence – reduction of process costs and increasing economies of scale**
- Tying customers with strong contractual clauses and significant price reductions
- Liaisons were established between the NutraSweet Company and government officials, specifically the FDA and U.S. Department of Transportation
- Relationships were established with the AMA, the American Diabetic Association, the Multiple Sclerosis Society, and other public health organizations

4. Which corporate level strategy would you choose for Searle's sweetener business? Present tangible suggestions and strategy recommendations and justify them. (5 points)

Evaluation: An informed and analytic discussion based on the four previous analyses is valued. Only focusing on part of the points presented here is also possible. Specific focus is put here on the argumentation and how well the arguments are based on previous points and grounded in technology strategy thinking.



5. Which organizational arrangements would you choose for the presented strategy?  
Present tangible organizational suggestions and management recommendations and justify them. (5 points) (5p)

Evaluation: An informed and analytic discussion based on the four previous analyses is valued. Only focusing on part of the points presented here is also possible. Specific focus is put here on the argumentation and how well the arguments are based on previous points and grounded in technology strategy thinking.

END

ADDITIONAL COMMENTS:

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