MOT1433 Technology and Strategy

Session 11: exam preparation

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Question 1a

The American economist William Baumol argues that the success of a capitalistic economy can be explained by routinization of innovation processes in big firms. Big firms have sufficient resources to maintain a continuous process of producing innovations. The Austrian-American economist Schumpeter developed an innovation theory in two parts, so-called Schumpeter I and Schumpeter II.

1a. Describe both parts of Schumpeter's innovation theory and explain whether or not Baumol's ideas are related to either one or both of them.

- Schumpeter I: in the 1910s during the Electricity GPT: creative destruction/rules changers
  New firms are the vehicle of innovation in contrast to large incumbent firms. New firms or entrepreneurs embody new combinations that drive innovations and increase competitiveness in the market
- Schumpeter II: in the 1940s after the Electricity GPT: large size firms have a higher probability to innovate. Technological progress or innovations arise from big firms that have more financial resources to deal with the uncertainty of innovation processes
- Baumol's ideas are related to Schumpeter II because of the big firm link

Question 1b

The focus of big firms on routinization of innovation processes triggers governments to formulate policies aimed at stimulating collaboration schemes through technology clusters.

1b. What are technology clusters and how do these stimulate innovation

Technology clusters encompass an array of industries that are linked through relationships between suppliers, buyers and producers of complements.

One primary reason for their emergence is the benefits of proximity in knowledge exchange. Although ICT allows transmitting information over great distances, **complex and tacit knowledge** is harder to transfer through such mechanisms. These kinds of knowledge require frequent and close interaction to be meaningfully exchanged (Schilling p. 32 – 33). Such exchange increases the changes of successful innovations. Knowledge spillovers are the key element.

Question 1c

1c. Is the following statement *in italics* true or false? Explain why. *Technology clusters as a way to stimulate innovations originate from the line of thinking that can be found in the Linear Innovation Model*

False. Technology clusters are characterized by interactions between innovating firms and hence fit in the interactive model of innovations or Innovation Systems

Question 1d

1d. The new manager of a Research and Development (R&D) department of a large pharmaceutical company has to decide on allocating his annual budget. He can choose between allocating it such that his R&D department will focus on basic research or on applied research.

What would you advise him? Explain why.

The Research and Development (R&D) department for a large pharmaceutical company should probably encourage its researchers to do both basic research and applied research. Basic research is directed at increasing understanding of a topic or field. This type of knowledge will help the company to better understand the medical field and to come up with approaches to applied research. For example, research to understand why and how people develop diabetes would provide guidelines into approaches to treatment. Applied research is targeted at increasing knowledge for a specific application. The development of new methods of treatment based on the findings of basic research would be the next logical step to take. This type of research would also require creativity and innovation but would be targeted at treating an illness in a certain way.

Question 2a

The main aim of a firm's strategy formulation is to achieve sustainable competitive advantage by reducing uncertainty of the firm's external environment. Two instruments to do so are the Five-Forces Analysis of Porter and the Value Net Analysis of Brandenburger and Nalebuff.

2a. Describe how both instruments can be used to formulate a strategy.

Porter's Five-Forces Analysis is a framework to explore the factors that affect the profits of a typical firm in the industry along two dimensions: vertical chain and market competition. The framework tells us that for instance the threat of entry is high but it cannot tell us how to estimate the probability of entry.

Value Net Analysis extends Porter's framework by paying attention to profit enhancing factors. Coopetition is a mixture of competition and cooperation.

Question 2b

A recent phenomenon in the strategic management literature is the concept of frugal innovations.

2b. What are frugal innovations and how do they fit in the strategic management literature.

Frugal innovations are existing products that are re-designed for the BoP (less than $ 2,- a day) or new products that are specifically developed for these markets. These fit in the strategic management literature as emerging markets in Asia and Africa are becoming important sales markets.

Question 2c

2c. Is the following statement in *italics* true or false? Explain why.
Using quantitative methods for choosing which R&D projects to pursue are the recommended methods in a rapidly changing technological environment

False.

In a rapidly changing technological environment it is hard to come up with reliable quantitative estimates of e.g. cash flows and discount rates.

Question 3a

A central element of a firm's strategic commitments is that these should be able to alter the competitor's behavior.

3a. What are the requirements of strategic commitments in order to change the competitor's behavior? Apply these to the real world example of Airbus vs. Boeing with regard to the respective plans and production of the A380 and the 747X.

1) visible; 2) understandable and 3) credible. Airbus strategic commitment to start building A380 was visible and credible but not understandable (as Boeing perceived the world differently). It might also be that it was understandable (In case Boeing was intimidated).

Question 3b

3b. Explain what it meant if a strategic commitment is *tough*.

A strategic commitment is tough if it is going to have an adverse effect on the competitors of the firm. It means in case of strategic substitutes that the positive strategic effect > potential negative direct effect.

Question 3c

3c. Describe shortly whether in the Microsoft case – as dealt with in class – the standard innovations protection mechanisms as summarized in the anti-trust laws did or did not work.

They did not work as they were designed for standard industries and production processes and not for software firms where network externalities play a dominant role which can lead to very skewed market share distribution as a normal outcome while at the same time competition can be vigorous. In other words, the existing IP rules assume that concentration in markets lead to less competition. An assumption that became a matter of dispute in the Microsoft case due to technological change in the framework of a General Purpose Technology.

Question 4a

4a Explain which aspects affect the value of a technology to users besides its technological standalone value in markets that are characterized by increasing returns to adoption.

Value from network effects; the more users adopt the technology (the higher the installed base) the higher the value of the technology to those users.

Value from complementary goods; the more complementary goods are available in which the technology is implemented, the higher the value of the core product in which the technology is implemented.

Question 4b

4b Firms can take advantage of the fact that users rely on both objective and subjective information in assessing the combined value offered by a new technology. Explain by describing the two subjective components that determine the value offered by a new technology. Also, mention at least one strategy that can be applied by firms to affect these two subjective components.

These include perceived and anticipated installed base / complementary goods / technological utility. Strategies that may be used to influence this include marketing through eg product pre-anouncements or communicating that 'the war is over' (as occurred in the case of Blu-ray vs HD-DVD).

Question 5a

5a Explain what is meant by path dependency and explain how it can relate to the phenomenon of technological lock-in.

The phenomenon of path dependency occurs when small random idiosyncratic events lead to major changes in the future possibly leading to lock in of technologically in superior standards (such as QWERTY vs DVORAK). Path dependency increases the switching costs from one technology to another

Question 5b

5b Explain why in some markets, which are characterized by increasing returns, multiple technologies may co-exist and achieve market dominance. Make use of a sketch (5 points)

In these markets customers attain their desired level of network externality benefits at lower levels of market share (Schilling p. 79 – 80; see figure 4.8 on p. 80).

Characterized by a steep *value to users* curve than in a unique single dominant design. No intersection between both curves but a large indifference region within neither technology dominates. Also a large customer market is required.

Network externality benefits to customers can already be achieved at lower market shares due to the quick rise of value to users curve.

Question 6a

6a Explain what is meant by the concepts installed base, availability of complementary goods and network effects, and explain how these factors for standard dominance are related to each other and to the concept of standard dominance. Make use of a conceptual model.

Installed base is the number of users of the core product in which a standard is implemented. Availability of complementary goods is the number of goods in which a standard is implemented. The goods are complementary to the core product. Network effects are the effects that may exist in markets characterized by increasing returns and that result from the physical interconnection of products in which standards are implemented. The products increase in value for consumers once more products are sold since more physical connections can be established. Therefore installed base affects standard dominance under the influence of network effects. Also, complementary goods affect standard dominance and complementary goods form a two way relationship with installed base. Network effects may also moderate the relation between complementary goods and standard dominance.

Question 6b

6b Extent the conceptual model (answer to question 6a) by including three other factors for standard dominance and argue how they relate to the factors in the model.

Several answers are possible. Timing of entry, financial strength, marketing communications, etc. may influence installed base. Network size and diversity may influence complementary goods. Commitment may form a moderating relationship between network size/diversity and complementary goods. Also, other market mechanisms or macro level factors may be included in the model as moderating factors for the relationship between installed base/complementary goods and standard dominance.