

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

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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. Patents provides an effective strategy tool to protect value of core competencies that are "tacit"

TRUE

FALSE Tacit knowledge is hard to explicate and put into text. It is also hard for competitors to acquire this type of knowledge, especially core competence, as these types of knowledge/knowhow are tacit. Therefore to bring the tacit knowledge of core competencies out as patents would kill the core value generator of the firm's competitiveness. To conclude it is not a wise strategy to patent tacit knowledge.

2. Modular innovations are usual in dominant design phases

TRUE

FALSE

3. A shift in dominant design occurs for example through architectural innovation

TRUE

FALSE

4. Early adopters (in Mores article about the chasm) are normally in charge of mission critical systems
 TRUE
 FALSE it is early majority

5. The two primary sources for increasing return to adoption are network externalities and increasing install base of a technology
 TRUE
 FALSE
We decided here to accept both answers as well as those that did not respond. The two primary sources are learning and network externalities and an increasing install base is a network externality.

6. A winner take all economy is characterized by lock-in effects of producers of complementary goods around the winning technology
 TRUE
 FALSE
We here where thinking of that it is users that are locked in but it is true that also producers of complementary goods may be locked in. Thus we decided to accept both answers as well as the no answer option.

7. In one way networks the externalities are indirect through increases in the number of varieties of components
 TRUE
 FALSE
This is taken directly from the definition given and discussed during the lecture. While the question is not very clear and may cause misunderstanding, we decided here to accept both answers as well as the no answer option.

8. A key stone strategy of an incumbent firm includes sharing value with other firms
 TRUE
 FALSE

9. Compatibility refers to the ability of two or more given systems (e.g., devices, databases, networks or technologies) to act in concert with one another in accordance with a prescribed method to achieve a predictable result.
 TRUE
 FALSE
Again a tricky question. The correct answer would be False and that it is interoperability that holds these types of characteristics. While the difference in the words are hair thin we decided to accept both and the no answer here also.

10. To successfully overthrow an existing dominant technology, new technology often must offer compatibility with existing installed base and complements
 TRUE
 FALSE

11. The technology push mode of firms is characterized by incorporating latest technological advances, often from outside the company through academic collaborations
- TRUE
- FALSE
12. Salvaging refers to the process of killing a failing venture
- TRUE
- FALSE it refers to using parts of an already killed venture to further build on the knowledge and assets the venture has incorporated**
13. Research and innovation alliance provides the context and incentive to take more risks compared with joint ventures generally
- TRUE
- FALSE
14. Ambidextrous organization concept refers to the inability of organizations and corporate top managers to control long term and short term firm innovation activities
- TRUE
- FALSE The concept refers to the type of organization that is required to manage long term and short term firm innovation activities.**
15. Internal ventures enjoy greater autonomy than SBU R&D teams.
- 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

1. Which of the following cannot be copyrighted?:
- Recital of a poem
 - Performance of a ritual dance
 - Discovery of a new type of transistor
 - Singing a song
- ANSWER: ___c

2. Discovery-driven planning is an appropriate planning method particularly in situations where:
- the future is highly uncertain
 - customer preferences are well known
 - dominant design is locked in a well defined trajectory
 - competition is driven by economies of scope
- ANSWER: ___ a
3. Disruptive innovations
- creates entirely new markets
 - results in new products with lower performance compared to existing ones
 - don't address the next-generation needs of leading customers in existing markets
 - breakthroughs which creates next generation products for existing customers
- ANSWER: ___ a, d
4. The core dimension in prioritizing new product development projects is NOT
- process change
 - product change
 - manufacturing change
 - organizational change
- ANSWER: ___ d
5. To manage different types of development project firms should make use of
- Discovery driven planning
 - Aggregated project planning
 - SWOT analysis
 - Lead user research
- ANSWER: ___ b
6. The main problems of internal corporate venturing is NOT that
- managers capacity to deal with sustentative issues of new business opportunities is limited
 - managers expectations concerning what can be accomplished in a short time framework are often somewhat unrealistic
 - top management can't appreciate the relative small size of ICV projects
 - top management aren't able to stay away from active management of the ICV process
- ANSWER: ___ d
7. To manage strategic dissonance managers need to:
- constantly watch old competitors
 - constantly watch new competitors
 - hold back the emerging strategic picture
 - create a fear free internal selection environment
- ANSWER: ___ c

8. Success factors in dominant design situations are NOT
- a. Non-product differentiation (service, etc.)
 - b. Invest in specialized assets
 - c. Cost, Scale, Experience
 - d. Price
 - e. Use generic (low-cost) assets from the market

ANSWER: ___ e

9. Core competences are NOT about
- a. when two or more SBUs use a common component
 - b. organization of work
 - c. the collective learning in the organization how to coordinate production skills
 - d. harmonizing streams of technology
 - e. delivery of value
 - f. vertical integration in the organization

ANSWER: ___ d

10. When BMW introduces a new fuel injection system to its diesel engine cars, this is an example of _____ in those cars:
- a. incremental innovation
 - b. architectural innovation
 - c. modular innovation
 - d. radical innovation

ANSWER: ___ c

C. OPEN-END QUESTIONS (max 25 points)

Mini case: Apple iPhone

Read the 9 page article and fact compilation about Apple and iPhone and present your analysis within the scope of the questions. Use additional paper if necessary for answering.

1. Analyze the iPhone business and Apple in the light of the Teece model. What kind of strategy should they pursue under this model? (5p)

Points to cover

Issues key to discuss in relation to the Teece model: appropriability, complementary assets and dominant design.

Dominant design The device can be said to be a user friendly multimedia Internet-enabled mobile phone and PDA (Personal digital assistant) and a successor to Apple Newton which was the first PDA to the world announced in 1992. If the PDA is in a dominant design or not is a tricky question. One should definitely point to current PDA devices and bring up issues that may be relevant for determining where Apple iPhone stands. Apple iPhone can be said to be a second generation PDA (a smart phone) with the new features of internet connectivity and color display with music, photos and video watching abilities. In this sense it is a multimedia device and a handheld computer.

1) **Appropriability.** Appropriability depends on a) The nature of technology (tacitness, complexity, systemicity, and product-process nature) and b) efficacy of legal mechanisms of protection. Apples iPhone, the device (hardware) and the enabling technologies (predominantly software) are rather easily re-engineered. Apple has chosen a closed architecture for the software part. Apple holds 300 patents around the iPhone which is off course a strong protection currently but the ability to continue protect it is much more weaker due to ability to re-engineer both hardware and software. This said the iPhone can be said to be in a rather weak appropriability regime environment. A strong asset from which Apple gains value from is the brand name especially among Apple computer and iTune owners. They can really build on this ecosystem further and also protect it. Thus the brand reputation of Apple and the iPhone provides a rather strong appropriability regime. This also indicates which its strongest competitors are.

2) **Complementary assets.** Complementary assets should be analyzed by a) describing the business model with multimedia devices b) own asset audit - Are they generic, specialized or co-specialized?) – where lies Apples assets c) asset availability analysis - **Are they generic (free), specialized (constrained) or co-specialized (constrained)?** d) analyzing likelihood of downstream, horizontal, upstream competitive diversification and integration of e-book business and e) how does the criticality of complementary assets in e-book business change over time?

The complementary assets for Apple iPhone is the software and services able to attach and be used in and with iPhone. Also the devices (hardware) that may be attached to the iPhone are complementary assets, including compatibility with iTune and related devices. Also the linking of the device to the network is an complementary asset. Thus network operators should be discussed within the complementary assets and if they are freely available or not. As most of the countries in the world hold more than one operator one may conclude that this asset is rather freely available but certain constraints relates to the necessity to negotiate with many partners in the world. Sales channels are a complementary asset. The Apple store and the operators are here complementary assets of which it has chose to own the stores.

2. What are the key externalities that Apple needs to catalyze around iPhone (5 points)

The five factors contributing and enabling technology related externalities are: learning by using, network externalities, economies of scale, informational increasing returns, and technological interrelatedness. The key externalities arising from these are listed below:

1) Install base of iPhone. There are both one-way network externalities linked to the direct number of users increasing the value e.g. the increase in availability of complementary assets and then the two-way network externalities that increase the value of the iPhone directly through increase in user base as for example the visual voice mail which require other iPhone users to receive these. This is a network externality and a services that also binds together iPhone users. With the increase of the user base of iPhone there are obvious visibility, acceptability and necessity (modernity and culture) drivers that increase the value for both current and possible users of iPhone. The interesting thing with Apple and its devices are of rather closed architecture (the devices and especially the software part). In this way one should think of how Apple may extend the user base through existing Apple computer and iPod users. The iPhone also includes a new device in the Apple "world" that provides an externality to the Apple computer and iPod user base. This is a very interesting business strategy in which Apple seems to take a lead in exploring the mechanisms that drives the externalities of product families in the area of multimedia, information and communication technologies.

There are several strategies one could think of here as: advancing visibility and acceptance through marketing, more aggressive pricing of the iPhone, targeting different user groups as business people, Apple fans, and youngsters through different strategies, extending distribution network of the iPhone (number of stores and network operators selling iPhone around the world).

2) Complementary assets availability, production and attachment. Apple is producing the device at Foxconn/Hon Hai Precision Industry Co Ltd (the world's leading manufacturing services provider (An ODM) for information technology devices located in Taiwan; also the iPod and MacBook computers are assembled by Foxconn). They again of course rely on several OEMs for the different parts as: PCB, camera module, camera lens, magnesium-alloy case, connector, push button, memory module, USB IC, passive components, and quartz components. In relation to the software Apple is relying more on its own competencies and has in this first phase relied on a closed architecture. Steve Jobs has announced that Apple will launch a software development platform in early 2008 which seems like a good strategy to get externalities running. Another asset that is important to advance for enabling externalities is the speed and reach of the network connection to make use of iPhones features. Also the already strong links between iPhone, iTunes and Apple computers could be advanced as to advance to whole product family network ecology. One could in this also discuss and think more carefully about the abilities of Apple to keep the architecture closed? Can it control the product network architecture specifications and if so how?

3) Technological interrelatedness, compatibility and interoperability. The phone is not open for third part operators limiting the number of complementary software and services. This is Apples strategy and alternatives could be discussed here.

4) Learning by using is also a critical externality to enable. This extends to both the value network (complementarities) around the iPhone as well as how users learn and provides support for exploring further the use and usage of iPhone type devices. Production costs decreases with increasing number of products on the market. Enhancing R&D in iPhone related hardware and software technologies should also enable the value of the device and bring down the price in key and costly components.

3. What evidence does the case provide to suggest that the iPhone represent a disruptive technology? (5 points)

Points to cover

First the main points from Christensen where: 1) Incumbents get replaced because they fail to give sufficient attention to threats by substitution 2) The most dangerous technological threat is not that of radical innovation, but that of gradual, accelerating progress by seemingly inferior innovation 3) Markets and customer needs often fail to develop in step with technological progress 4) The very processes, which enable dominant firms to remain profitable, may render them vulnerable to piecemeal, subtle technological change by disruptive technologies.

1. What is the disruptive technology in the iPhone case?

The distribution of it all is really subtle one in this case. One should here discuss if iPhone will become disruptive technology that **overturns other mobile phone and PDA or even pocketPCs**. Does the phone as a multimedia and internet connected mobile phone really constitute the disruption here? I would say that the hardware does not contain the direct elements of disruption, perhaps only in part related **internet access of a portable device and the touch screen**. It is rather the **compilation and interface of the device** and the different usages of the device, as multimedia device, internet, mobile phone and PDA, that together holds the elements of disruption. It is the hard and soft design together in a compilation that seems disruptive here. But again the browser that you find on iPhone (Safari) is really close to the one on Nokias N95 which when further studied we find emanating from a development project in 2005 between Nokia and Apple. **Mobile phone manufacturers have increased the technical features on their phones to heights which are over the ability of the user to embrace**. This is typical in disruptive technology situation. But again what is the new thing about iPhone really if you find same technology in Nokias N95. I think one thing is that users require something different which in this case seems more about **the experience and the activity of the device** than technological superiority. Thus it is equally important with design and user friendly interfaces which makes the device 'desirable'. But the iPhone upsets much more. **The balance of power in mobile communication industry is in shake**. Carriers are learning that the right phone — even a pricey one — can win customers and bring in revenue. Manufacturers, now enjoy new bargaining power over the carriers they've done business with for decades. This the business logic and the logic of competition are changing. One final feature of iPhone and disruptive technologies is the choice by **Apply to start with the 2 G technology for iPhone** (the interface between the device and the network base stations). This was said to be a choice due to high battery use of 3G. This is typical for disruptive technologies to start below the threshold of current main market technological efficiency/quality. The value proposition lies differently for disruptive technologies.

2. Incumbents reactions – insufficient attention to substitution

A small incident that one may recall from the visiting lectures is Yrjö Neuvos reaction to Apple iPhone as a threat to Nokia. We mainly did not see any threat as the gadget was far more inferior (technology wise) than their Nokia Tablet or the N series. Also he referred to the incapability of Apple to compete with such small volumes in the market. He did not see Apple and iPhone as a threat (at least he said so). The most severe disruption are often directed at the classical incumbent behavior in the face of disruption, by trying to co-opt the disruption by weaving the new business (the multimedia device PDA) into its extant, integrated model.

A note on Apple and iPhone as cross boundary disruptor "A powerful entrepreneurial change agent whose strategic actions materially affect the equilibrium in an adjacent or neighboring industry. The cross-boundary disruptor (XBD) relates to the Schumpeterian entrepreneur as inter-industry-level change relates to industry-level change." (Burgelman, Grove, 2007)

4. What is the broader value and activity system to which Apple with iPhone needs to attach itself? How can it emerge as the one who controls the key resources? How can it control system evolution? (5 points)

Points to cover

Here one should evaluate how Apple may control critical assets, provide system coordination, and share value for system evolution and control around iPhone. 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.

1) Control critical resources in the broader value and activity system.

The hardware seems less critical as these technologies are freely available in the market through both OEMs and the design and assembly by ODMs. But some of the hardware may still become critical, especially **touch screen technologies and critical technologies linking the device to the network and enabling the downloading of content** (speed, quality, low battery use). Here important is how to better gain control over these technologies and their specifications. One strategy would be scouting these new technologies around the world and buying patents or investing in ventures. The later strategy again would mean going into **external venture capital activity, an Apple VC fund**, which does not exist currently (at least in public). **Network operators** are again critical especially for Apple and iPhone in relation to gaining first mover advantages within this new business model of highly attractive devices. Here **contracting is critical and when possible longer term contracting for iPhone and related service provision**. Software and interface programs are critical assets of Apple, which they hold strictly internal (closed architecture). To further hold and strengthen this in the new domain will also require active acquiring of valuable new software technologies outside Apple. Content is a bigger question mark but traditional media versus targeted/tailor information/media services, multimedia distribution and sharing seems critical especially looking forward on the evolution of the multimedia PDA type devices and content related services.

2) Coordination and guidance to enable emergence of dominant design. If able to gain an early broad control over network operators in many countries through longer term contracts Apple may also be able to push further network operation characteristics that would be supportive for iPhone usage. On the other hand this may prove hard as they are competing with much larger mobile phone and network manufacturers and these may easily create barriers for Apple in many ways. Thus Apple needs to think carefully how to attach itself to this ecosystem, through partnering or alliances with e.g. Nokia (which it actually had started in 2005 but terminated later). For controlling OEMs and ODMs, contracting seems also key, especially long term contracting, but also support for R&D in critical device related technologies could be useful. The reliance on one ODM, the Foxconn, for several Apple product family devices should be critically evaluated. On the other hand this may prove a good strategy as they may better control Foxconn and their activities with other mobile phone manufacturers. This will also require sharing value to OEMs and ODMs.

3) Preemption. Build installed base early but remember to share value. Apples launch of the iPhone can be already evaluated as a good step for gaining position in the activity system of handheld digital media and phone devices. Another strategy which Apple has now taken, to build contracts aggressively with network operators for iPhone distribution, seems also as a good strategy for increasing user base. One should here though remember to create benefits for operators also to prevent loss of gained position in a geographical region (iPhone distributors – could also include ability to attach other Apple services). Also reliability of network operators are crucial for the device to be of value to customers and thus carefully selecting those operators which have broad reach.

4) Expectations management / strategic intent. Apple announced already over half a year earlier the launch of iPhone and has since then already given ideas about the next version. But secrecy seems more the strategy of Apple than active expectation management around technological specifications. Rather Apple draws on the experience and the “coolness” of the new devices for the user as well as user friendliness. Thus expectations are build up differently than usual strategic intent related “broadcasting”. But Apple is evolving into a firm with several related technologies that might also be advanced as a group of products. Thus one could discuss whether Apple could provide more “vision” where they are aiming for in the long term around iPod, iPhone, and computers, an ecosystem vision which includes expectation management for both manufacturers as well as current and possible users.

5. Which organizational arrangements and corporate level strategy would you choose for Apple iPhone business? Present tangible organizational suggestions and strategy recommendations and justify them. (5p)

Possible points to cover

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.

A) Internal corporate venturing – autonomous strategic action

One would probably conclude that Apple and the iPhone business should be allocated as an autonomous strategic action which is based on a firm's knowledge and resources that are the sources of the firm's innovative capacity. In this type of mode a firm's technological capabilities and competencies are its basis for new products and processes. A separate business unit is thus probably the way to organize this activity but it should be kept well integrated with those part of Apple that maintain and hold core competencies (see B for more on this).

B) Nurture and organize around core competencies

The core competencies of Apple could be identified as user-interface, user experience, software, and soft- and hardware integration. All these related to usability of technology including design, human technology interfaces and branding and marketing. As the iPhone and the other Apple devices dras on these it requires clsoe management of the coevolution of these core competencies in line with each business segements specific characteristics. This require organizational and management structures to facilitate a productive intercation between the core competencies parts and the business units parts (e.g. iPhone, iPod, and Apple computers).

C) Allocate focus and resources to dynamic capabilities

Collaborative skills like listening, peer interaction, and speedy responsiveness and innovativeness will be really important for furthering Apples move into the mobile telephony business/ multimedia PDA type device market. These dynamic capabilities needs close nurturing, formal positions of responses, and to be at the top of the list of issues to attend to for top management.

C) Partial opening of the architecture

This is a tricky question and no easy answer in this sense. While Apple for iPhone has chosen a rather closed architectural strategy for iPhone they have now announced the partial opening of this for software developers. This is probably a good strategy and will require further close monitoring of how the ecosystem and developer community around the iPhone evolves. One would probably conclude that Apple needs to open the architecture but also stay in some control over it. This would mean also beeing attentent to new inventions in their domain that may be aquired. The same discussions goes for the content production and provision part whcih should probably also be opened at least partly. Another option is to actively contract with content producers and develop service forms like iTunes.

D) Contracting and alliancing

Here a discussion about contracting with network operators would seem a viable strategy (see the previous points on this). Also alliance with content providers would seem important. How one should go along with firms like Nokia, Sony-Ericsson, Samsung, LG and others is tricky. One could discuss benefits and drawbacks and how to position oneself in the evolution of the mobile device industry.

END

ADDITIONAL COMMENTS:

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