The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	MASTER OF TECHNOLOGY IN INDUSTRIAL ENGINEERING
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX7118 – TECHNOLOGY MANAGEMENT**
Academic Year	:	2012/13
Date	:	04th August 2013
Time	:	0930 hours -1230 hours
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 6 questions.
3. Answer only five (05) questions. Question No 1 is compulsory.

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1. Read the following article, and answer the questions (a) – (e)

Good Technology, Bad Management: A Case Study of The Satellite Phone Industry

Satellite phone services use advanced technology to deliver phone service around the world. Although technologically advanced, satellite phone companies have not captured a substantial share of competitive mobile phone markets nor returned large profits to investors. During the Operation Iraqi Freedom in 2003, satellite phone services enabled round-the-clock television coverage of the battlefield. Lacking conventional wireless or cable telecommunication infrastructures, embedded journalists used videophones equipped with small satellite antenna to deliver live reports from the frontline. Through satellite transmissions, viewers watched live broadcasts of troops in combat and missiles striking Baghdad. News coverage of the war illustrated satellite phone services' potential to transform how the news is communicated across national boundaries and from conflict torn regions.

Cellular and PCS phones eased communication, consumers' mobile phone companies as providing unreliable services through the mid-1990s. Due to their rapid expansion, mobile phone companies lacked the infrastructure to support customers' needs. For example, cell phone companies frequently lacked enough cell sites to provide the bandwidth necessary for providing customers with basic services. As a result, mobile phone users were frequently unable to make calls or had their connections were dropped mid-sentence. Also, mobile phone companies used different communication technologies within and across countries. When travelling within a country, cell phone users would frequently find they were either unable to make or had to pay roaming fees for a connection. When travelling abroad, cell phone users had to lease or purchase new equipment to access mobile services.

Due to the limitations of existing mobile phone technologies, satellite phones were perceived as an attractive alternative wireless phone technology. By using satellites to transmit messages, investors believed they could address the signal quality, roaming and infrastructure problems that plagued conventional mobile phone services. When compared to cell phones, satellite phones had access to more bandwidth that could enable stable voice and faster data transmission. Because of their globe spanning infrastructure, satellite phones would not require roaming fees or present compatibility problems across networks. Analysts envisioned a world in which users could use the same handset to communicate data whether they were climbing Mount Kilimanjaro or laying on a beach in the South Pacific.

Established in 1991, Iridium was the first active satellite phone network. Many well known companies such as Lockheed, Sprint and Sony, provided financial or technical support to the new firm. During May of 1997, Iridium launched the first satellites of its network. When complete, the Iridium system provided robust voice and data solutions across the globe. Without roaming fees or compatibility problems, Iridium users placed calls from any location including oceans, airways, and mountainous regions.

Many consumers may not value quality as much as cost when purchasing communication services. In order to win market share, Iridium focused advertising on differentiating satellite and conventional mobile phone services. Advertisements suggested that satellite phone services quality and reach distinguished Iridium's service from less sophisticated mobile phone services. Even though Iridium effectively differentiated its services, consumers were not willing to incur the high start-up and ongoing costs of satellite phone service. Original retail prices were $3295 for a satellite phone, $695 for a pager, and airtime fees of up to $7 per minute. Given the high price for Iridium's service, consumers could not justify the additional expense over using other phone services. Due to its billions of dollars in debt, Iridium could not offer consumers lower rates for voice and data communication services.

Network effects of existing technologies placed Iridium at a disadvantage when compared to existing mobile phone services. Network effects refers to a service or technology becoming more valuable as more people use it, which may allow firms to lower costs and eventually acquire more customers. By the mid-1990s, mobile phone companies had acquired a substantial customer base in many countries. In countries such as Hong Kong or the United States, mobile phones had become part of daily life for many citizens. Because adding additional customers required relatively little additional investment, mobile phone companies had resources to invest in developing more reliable technologies and expanding their infrastructure. During the 1990s, mobile phone service expanded the size of their calling areas through strategic alliances. By the time Iridium initiated services, mobile cell phone companies had achieved a critical mass of customers necessary to dominate the marketplace.

By the time Iridium initiated services, cell phone companies had addressed many of consumers' complaints linked to signal quality and roaming fees as well as lowered the costs of services. Consumers felt that mobile phone services' low airtime fees and start-up costs compensated for satellite phone services worldwide coverage and higher reliability. In essence, consumers substituted technically inferior services for Iridium's satellite phone service.

Iridium's management failed to target many potential market niches. Iridium's advertising strategy focused on large, corporate customers such as oil or aviation companies, however, it did not focus attention on other niche markets such as small businesses or residents of remote regions. A more

effective marketing strategy might have targeted small businesses such as importers that require ubiquitous or high quality access to maintain relationships with their global network of suppliers and clients. Iridium also failed to market services to residents of lightly populated, inaccessible areas that lack terrestrial phone service. If Iridium had engaged in a size or geographically based marketing strategy, it might have won customers as well as generated good "word of mouth" advertising.

Iridium failed to acquire the critical mass needed to surpass entry barriers presented by existing services. The expected break-even point for Iridium was estimated to be 600,000 customers around the world. By the time it filed for bankruptcy, Iridium had acquired 55,000 customers. Due to its pricing, changes in the mobile phone market, and focused marketing strategy, Iridium never gathered the critical mass to support basic operating costs or to lower prices as a means to attract customers.

Even though Iridium offered superior services, consumers did not flock to purchase satellite phones. When compared to traditional services, consumers found that Iridium's costs (i.e., expensive proprietary equipment and high service fees) outweighed satellite phones' benefits (i.e., reliability and access). Also, by the late 1990s, consumers perceived existing mobile phone companies as providing adequate access to their networks. For example, companies such as Verizon or AT&T offered phone packages that included unlimited minutes and no roaming fees. Because consumers' weak response, Iridium filed for bankruptcy on August 13, 1999.

a) What were some of the problems of mobile phone services during the 1990s?

(08 marks)

b) What are the advantages of the satellite phone service over the cell or PCS mobile phone services?

(08 marks)

c) What did the terrestrial mobile phone companies do to cope with their narrow service region?

(10 marks)

d) What market did Iridium try to target?

(06 marks)

e) How did mobile phone companies develop "substitute services" for Iridium?

(08 marks)

2. a) What is technology and how does it relate to the society?

(07 marks)

b) Can technology take over the society and direct it?

(08 marks)

3. a) What do you understand by the Scientific Basis of Technology?

(06 marks)

b) Can Technology exist without Science?

(05 marks)

c) What do you understand by 'Conquest of Nature'?

(04 marks)

4. **Answer Part A or B**

Part A

Compare and contrast the technological developments of Britain, France America, Germany, Japan and USSR. They were partners in different groups, in the first and second world wars. Did the method of transfer of technology affect their politico – military alliances?

(15 marks)

Part B

Public sector projects for industries and infrastructure in the Third World were often financed by "tied aid", which meant that the capital equipment, design, engineering and technology had all to be purchased from the countries providing them. At times technologies were already or soon obsolete or were unsuited to local conditions. In many cases the agreements did not allow domestic firm or their expansions, Do you agree? Explain your position.

(15 marks)

5. **Answer Part A or B**

Part A

Can invention and innovation be planned and then made according to that plan?

(08 marks)

Do you think management should recognize 'talent as a separate entity'?

(07 marks)

Part B

How did the market affect the technology management at the time of industrial revolution?

(07 marks)

Is it correct to say that innovation was independent of management? Give reasons.

(08 marks)

6. **Answer Part A or B**

Part A

What skills and tasks would be necessary by a man, who is fitting panels to a car body on a production line?

(07 marks)

Compare this with the work content of a peasant farmer in Sri Lanka. Which of these persons would have a more varied, may be difficult, but more enriching task?

(08 marks)

Part B

"In a labour –intensive economy it takes perhaps the equivalent of six months' salary to buy the equipment needed to provide work for one man. In a capital intensive, advanced technology economy, the equivalent figure 350 months' salary. It is thus easy to see why development using western technology has been such a slow process". Comment.

(15 marks)

END