THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
MASTER OF TECHNOLOGY IN INDUSTRIAL ENGINEERING – LEVEL 7
FINAL EXAMINATION – 2008/2009
MEX 7118 – TECHNOLOGY MANAGEMENT
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DURATION : *Three (03) hours*

041

This paper consists of five (05) questions. Answer question 1 and three (03) others.

1. Given below is a brief case of a technology-based small firm in Korea. Using the information from the case, answer the questions.

Case Description

Medison is one of many small firms that spun off from the Korea Advanced Institute of Science and Technology (KAIST). The founder, Dr. Lee and his four co-founders were graduate students in electronics engineering field under Professor S.B. Park. Professor Park directed a 1984-1985 research project on ultrasonic scanner technology jointly funded by the government and a local medical equipment manufacturer. When the medical equipment company withdrew the project, the team led by Dr. Lee decided to form a new venture in 1985 as the requisite industrial partner. A person experienced in medical equipment marketing and a young man with experience in venture business management joined the team. The team members had already published eight research articles and obtained four patents on ultrasonic imaging by the time they founded Medison. They published five more articles in the following years in IEEE Transaction on Medical Imaging.

The project on ultrasonic technology was funded four years before and after the inception of Medison, leading to progress in this mission-oriented research at a KAIST laboratory, which was effectively transferred to Medison. In its first year, Medison received a critical loan from the Korea Technology Development Corporation, the first venture capital company established by the government.

The first-generation scanners were largely linear-only types to meet the growing needs of the domestic market. The team searched extensively in academic and trade journals, catalogs and technical reports from such leading medical equipment manufacturers as General Electric, Toshiba and Aloka. Examining foreign models used by large general hospitals in Seoul also helped to translate the team's academic knowledge into practical knowledge.

The team established an ambitious goal of completing the development of a prototype within two months so they could exhibit it at the Korea International Medical Equipment Show (KIMES) in September 1985. KIMES offered the best opportunity for Medison to debut and get the widest exposure to local as well as foreign medical equipment dealers.

The team lived together in an inn near the KAIST campus. There they worked around the clock for two months, translating their innovative patent for eight-point continuous focusing technology into a working model in time for the show. Its working model was exhibited along with sophisticated designs from Toshiba, General Electronic and Aloka. The team won an Industrial Award from the government in that year.

Medison placed working models in two university teaching hospitals in Seoul before it began marketing the product, SA-3000, in February 1986. Thanks to the government restriction on imports of foreign ultrasonic scanners by imposing high tariff barriers, small hospitals in rural areas could not afford to purchase foreign scanners, creating a rural market for Medison to penetrate. Thus in 1986, Medison sold more than thirty units to rural hospitals. But the scanner was so unreliable that its image was blurry and often faded away. It broke down completely two or three times a month, forcing the Medison members to be on the road constantly to service their products. It was a technical failure as well as a commercial disaster.

In desperate financial straits, the team needed to develop a commercially successful model. Once again they worked day and night for four months. Experienced gained from the previous one and lessons learned from its users provided technology capability to develop a second more reliable model, SA-3000A, which also incorporated a unique digital scan converter developed by the team and was commercially successful. Medison sold more than 100 units during the first year, and in the following year it began exporting to Turkey, Pakistan, Italy, Hong Kong, India and Mexico.

Sensing a potentially large market not only in Korea but also abroad, Medison attempted to develop an inexpensive portable model, SA-100. By this time, the government gradually liberalized the scanner market. However, given the company's reputation from the SA-3000, and portability of the compact scanner, SA-100 was sold well among rural Korean hospitals. But the scanner was noisy, poor in image, and low in heat resistance, leading to system breakdown. It was another disaster for Medison. However, based on this experience, in 1988 Medison came up with an inexpensive, reliable, fully-portable compact model: SA-88. After exhibiting the model at several European International Medical Equipment Shows in 1989, Medison began exporting it to Europe, the Middle East, and Asia. By 1990 SA-88 had received U.S. Food and Drug Administration approval and became the best selling portable model in developing countries for many years.

As a way to challenge the sophisticated market in developed countries, Medison continued to progressively move from linear-only models to linear/sector models and to linear/sector/convex models. This movement was based on its own R&D and joint research with KAIST. Medisc

developed its SA-4000 model in 1988, which incorporated patented uniform ladder algorithm (ULA), which significantly improved image quality. But its quality was noticeably inferior to that of comparable foreign models. In 1989, based on the experience gained Medison developed a better scanner, SA-4500, with a high quality sector/convex image supported by ULA. The SA-4500 model dominated the domestic market even in the face of intensively increasing foreign competition. During this time, KAIST completed Doppler technology (color-flow mapping). Medison incorporated the Doppler technology in its linear/ sector/ convex/ Doppler scanner, SA-4800, which became hot-selling model abroad. Doubling its sales every year, by 1990 Medison grew to 140 employees with sales of $10 million, half from exports.

Pursuing its global strategy, Medison established overseas marketing subsidiaries in the United States, Europe, Russia, China, Japan, and Singapore indicating its determined marketing strategy in advanced as well as developing countries. Medison is also developing a joint research program with Russian R&D institutes on endoscope and next generation of Doppler technology. In mid 90s Medison acquired 60 percent ownership of Kretz, an Austrian ultrasonic producer. The Austrian firm is the most advanced in three-dimensional scanner technology.

Today, Medison is leading the way as the developer, manufacturer and marketer of the most advanced line of ultrasound diagnostic scanners. Medison is entering the global top list as the world-class specializer in these scanners towering the medicine industry. Medison's innovations in digital imaging technology are making a difference in hospitals, clinics, and private practices around the world. Through its global network, extending to more than 80 countries, the company provides a comprehensive range of state-of-the-art ultrasound products from portable devices to multi-specialty real-time 3D systems that is meeting the demands of healthcare professionals for greater functionality, reliability, and diagnostic accuracy.

The development of automatic volume data acquisition, multi-beam technology, and Live 3D are just a few of the company's technological breakthroughs. Unique to Medison, automatic acquisition enables users to acquire an entire volume of data in a single, static action rather than separate slices of information in several movements, resulting in more exact spatial relationships and more lifelike images. Using Medison's automatic data acquisition and live 3D technology, which provides image display in real time; physicians worldwide are performing a greater number of clinical applications with greater diagnostic confidence than ever before.

(a) Explain how Medison acquired their technologies highlighting the milestones in this process.

(20 marks)

(b) What were the most essential technological capabilities in this case? Justify your answer with specific references to the stages of development in the firm.

(15 marks)

(c) Identify and briefly explain the different technological strategies Medison was pursuing during the technological development of their company?

(20 marks)

2. "No transformation can take place in the complete absence of any of the 4 components of technology although their relative importance would vary depending on the nature of the activity." Justify your answer.

(15 marks)

3. Should we go for technological forecasting when we know that the forecasted future may not happen? Justify your answer.

(15 marks)

4. From a technology transferee's viewpoint, what are the advantages and disadvantages of licensing technologies from multiple sources - and integrating them into a workable production system - as compared with entering a joint-venture with a single foreign partner?

(15 marks)

5. Most successful businesses have achieved their position not from glamorous, earthshaking breakthroughs, but rather from exceptional pursuit for continuous improvement". Critically discuss the validity of the above statement in the case of technological development in developing country firms and explain a plausible path for developing country firms to improve their technological status.

(15 marks)