Company overview samsung sdi commerce essay

Samsung SDI, a unit of the Samsung Group, is a world renowned display company. It has worlds leading technology in many display products such as color picture tubes (CPT), plasma display panels (PDP), liquid crystal displays (LCD), organic light-emitting diodes (OLED), and most recently active-matrix OLED (AMOLED). It has successfully maintained the top place in the global display industry for more than a decade[1].

Recently, however, Samsung SDI has been trying to change their business focus from display to energy industry. With growing concerns about reducing carbon emission for the environment and finding alternative fuel for oil, there has been increased demands for the green vehicles around the world. In attempt to acquire this fast-growing market, Samsung SDI now focuses on developing batteries for electric vehicles, which are considered to be the key proponent of green vehicles. Specifically, they have made a plan of acquiring 30 percent of the global lithium-ion battery market by 2015.

Therefore, this report will focus on the battery technology for the future green vehicle that Samsung SDI have developed, and through the close analysis, it suggests few managerial recommendations for the company in the end.

2. Company Overview – Samsung SDI

2. 1. Corporate History

Samsung SDI was founded in 1970 under the name of Samsung NEC. During the 70’s and 80’s, they mainly produced vacuum tubes and black & white picture tubes. After successfully achieving business diversification, and they entered the flat display business by introducing CPT in 1979, LCD in 1987,

and PDP in 1988. Samsung SDI marks the year of milestone in 1988 and become a global company as it achieved to build 10 million color Braun tubes, only after Phillips and Toshiba in the world. After gaining the momentum from color Braun tubes, they continuously had pursued to be a global display company through the globalization of their businesses in Malaysis, Germany, Mexico, China, and Brazil during the 90’s. With the emergence of digita era, their LCD division concentrated on producing the small size display for mobiles turned out be enormous success. They became the world’s No. 2 VFD maker during this period with improved quality and technology and also surpassed their original goal of acquiring 25 percent of world’s market share for display in the 90’s. They expanded their business line by introducing PDP and battery during this period. Beginning of 2000, they developed 102 inch Full HD PDP and OCED for the first time in the world[2].

2. 2. Restructuring

Despite these accomplishments, Samsung SDI also struggled during the recent economic recession. Their CRT division business was underperforming, and demand for PDP was deceased due to the the recession. The gross revenue in 2004 was $ 8. 01 billion, and this amount of gross revenue fell by $ 864 million each following year. Their operation profit fell from 8. 3 percent in 2004 to 2. 0 percent in 2006. In the year of 2007, the gross revenue was fell down to $ 4. 45 billion, which was just about the half of the prosperity year, and they had operating deficit of $512 million[3].

In response, Samsung SDI carried out major restructurings for their business. They closed down all domestic CRT production facilities and also suspended

inefficient PDP production lines. They pursued to increase efficiency through the integrated management with Samsung Electronics. The main idea for this strategy was that Samsung SDI can only focus on the production of PDP, letting the operation and marketing run by Samsung Electronics. In the past, Samsung SDI made the PDP modules, and then Samsung Electronics would receive these modules and make the final products. They could minimize the overlapping elements in PDP production and increase the efficiency by following this process.

This drastic restructing turned out to be success. In the late of 2008, Samsung SDI could increase their sale to $ 4. 58 billion and made the operating profit of $115 million. The deficit from PDP division was made up by the increased revenue from secondary batteries of mobile phones and laptop. The secondary batteris are recharaeable one and used in many portable electronic devices such as mobile phones, laptop, or digitla camera.

2. 3. Energy Industry

Meanwhile, Samsung SDI saw the potential of the fast-growing energy industry and tried to gradually change their business focus from display to energy industry. They believed that growing trend of “ pro-enviornment” would cause the market for rechargable secondary battery to grow dramatically. The original meaning of SDI was “ Samsung Display Inteface,” but they were so determinant to pursue the energy industry that they are now considering it to change it to “ Storage Development Inc.” to represent the company’s new business focus which involves energy storage[4].

The revenue of secondary batteries increased by 27 percent from 2007 with the sales of 476, 000 batteries. Samsung SDI has become the second largest producer of secondary battery with increased share from 15. 6 percent to 17. 1 percent whem moving from 2007 to 2008.

Among other types of secondary batteris, the damand for lithium-ion batteries were increasily raised as they were used in many portable electronic devices such as mobile phones and laptops. Additionally, lithium-ion battery started to be used in electronic vehicles and their fufure potential looked promising.

The technology of lithium-ion battery to be used in electric cars is at early stage, and its potential market size in future will be enormous. The lithium-ion technologies itself are evolvng very fast and the inceased global demand for hybrid and electric cars would accelerate the commericalization of ethium-ion batteries.

2. 4. The Vision of Samsung SDI

Samsung SDI was the world’s No. 1 display company with the world-leading technology. Now they are devoting their every effort in converting into becoming the world’s leading energy company.

“ Build a leading G·R·S company.” Kim Soon-Taek, the CEO of Samsung SDI, annouced a new vision statement for the company at the beginning of 2009. The annoucement has two interpretations. One version for G·R·S stands for Green(envrionment-friendly), Responsible(social responsibility), and Sustainable(sustainable growth). It shows the company’s ambition to

become a leading eco-friendly company, fulfilling social responsibilities while achieving sustaintable growth.

Another interpretation for G·R·S is that Generation(provides clean energy), Regeneration(provides alternatives for fossil energy), and Storage(achieves energy efficiency through the storage of energy). They are three main business areas that Samsung SDI pursue. Specifically, Generation area is about new generation solar cells and fuel cells business area, Regeneration area is about lithium-ion batteries for hybrid electric vehicles and other eco-friendly batteries, and Storage area deals with the small rechargable secondary battery[5].

3. Industry Overview – Batteries for xEV

As governments across the world grow more interested in reducing carbon emissions and the consumers' increased demand for higher fuel efficiency has given rise to the so-called second revolution of automobileâ€•the electricalization. There are mainly three types of vehicles that use electric power to move and the combination of them is called xEV[6].

3. 1. Three types of xEV

Hybrid Electric Vehicle (HEV)

This type of vehicle use both conventional internal combustion engine as well as electric propulsion.

Plug In Hybrid (PHEV)

They have a battery that is rechargable by connecting to external power. Generally, PHEV use only electic power when driving a short distance and

use both internal combusion and electric power when driving longer distance.

Electric Vehicle(EV)

They only rely on the electric motor, not having internal combustion engine. EVs are the ultimate enviornment-friendly vehicles not producing any emission.

The first xEV released was HEVs and as technology evolves, the power-transmitting role of internal combustion engine is being reduced gradually, relying more on the electric power coming from the battery. The current technology has yet to solve the potential problems of lithium-ion battery. The success and commercialization for these three xEV is depended on the technological development of its batteries[7].

The battery is considered the most important ket part in xEV. For example, the lithium-ion battery for EV, which drives with 100% electricity, constitues 50 percent of the total cost for the vehicle.

3. 2. xEV battery market

The reasons for rapidly growing recharable batteries for xEV are threefold. First, more countries demands and promotes for xEV as a way to preserve the environment. Second, countries such as the United States are actively supporting xEV and related industries to overcome the aftermath of economic crisis and prepare for future growth. Lastly, technologies used in rechargable batteries are evolving very fast, providing better stability and efficiency so that ultimately expanding the market for xEV[8].

Many experts predict that lithium-ion batteries will be a highly disruptive technology to dramatically change the whole automobile industry because of lithium-ion’s superior power and energy density compared to earlier batteries. As the emergence of celluar phones brought disapeearance of pages, a disruptive technology is something that cause to change the entire pre-existing industry[9].

The technology is still at very early stage for this type of lithium-ion battery used in electric cars, but their potential market size is enormous. The global demand for hybrid and electric cars would incease from the current number of 950, 000 to 5 million by 2015, constituting 10 percent of entire vehicles. Consequently, the market for xEV battery is expected to increase to the size of $ 8. 5 billion by 2015[10].

3. 3. SB LiMotive

Samsung SDI plans to meet this demand by developing lithium-ion battery for xEV. In June 2009, SDI and Bosch agreed to form a joint venture, named SB LiMotive, to produce this lithium-ion battery for hybrid electric vehicles. They expect that they can obtain the positive synergy effect from combining the world’s No. 2 lithium-ion battery producer and No. 1 supplier of automobile components. Samsung SDI has production experience as well as manufacturing competence in the area of rechargeable battery technology and Bosch has competence in integrating this technology to the overall system of automobile.

With an initial combined capital of $20 million, they plan to start the production of lithium-ion battery in 2010. The total investment is initially

expected to be $500 million in next five years. Depending on the market situation, this amount can be adjusted. Their goal is to become global leading producer of lithium-ion battery by achieving the world’s market share of 30 percent by 2015[11]. The venture made the first accomplishment in August 2008 when it first signed contract with BMW to supply lithium-ion battery cells for BMW’s first electric car, which is currently under development.

The first to present innovative technology will have the first-mover advantage in xEV market. In attempt to speed up the market introduction, many automakers and battery manufacturers have formed new joint venturs. They also forms strategic alliances. For example, automakers such as Toyota, Honda, Nissan, and Kia aleady signed contracts with battery manufacturers such as Panosonic, Sanyo, NEC, and LG Chem, respectively. The recent major trend for automakers is to establish alliance with multiple battery producers.

In early 2008, Panasonic showed their interests to buy Sanyo, the world’s No. 1 rechargable battery producer. Before this M&A plan was revealed, many car manufactors were trying to make their strategic alliances with Sanyo. Now that Panasonic, which Toyota owned 60 percent, is considering to buy Sanyo, they are searching for new partners or trying to multiply their partnerships in order to check Toyota, who is already the world’s No. 1 in HEV market.

For example, GM picked LG Chem as its sole supplier for Volt project, abandoing the old relationship with Sanyo.

4. Technology Innovation of Samsung SDI

4. 1. Comparison with NiMH battery

The current hybrid cars such as Toyata Prius and the Honda Civic Hybrid use nickel metal hydride(NiMH) batteries. NiMH batteries is considered to be more technologically advanced than the conventional lead acid battery from the gasoline automobiles. However, as hybrid cars with NiMH battery become popular, the cost of raw materials used in the production of NiMH battery also have risen, resulting the overall cost benefit from driving such hybrid vehicles being reduced[12].

On the other hand, the prices of raw materials used in lithium-ion batteries are not expected to fluctuate even if the demand for them increase, which enable manufacturers to acheive the economies of scale for lithium batteries.

Moreover, when compared to the NiMH batteries, lithium-ion battery has twice the energy density(kWh/kg) and twice the output density(kW/kg)[13].

(Insert Figure 1 here)

This means that lithium-ion batteries provide the same power at half the weight of the NiMH batteries. This also allows lithium-ion battery to drive a significantly longer distance with same weight. Other additional benefits may include higher durability and a longer lifetime as well as low self-discharge than conventional batteries.

4. 2. Limitation of lithium-ion batteries

However, there are also many downsides of lithium-ion batteries, providing rooms for technological developments. First, the battery should be able to

overcome the overheating conditions under the hood, not affecting its capability and lifetime. Second, perhaps most importantly, if a vehicle gets into a car accident, the battery must not pose an additional hazard such as explosion. Therefore, the R&D efforts for lithium-ion batteries should be focused on not only improving energy capacity but also on satisfying automobiles' safety standards. Lastly, the price for lithium-ion battery is still very expensive compared to other battery types. Currently, a single battery for an electric car can cost more than 10 million won. Because of this high cost, some experts estimate that it will need at least few more years for the commercialization of xEV. Before the market introduction, these problems must be met by technological improvements.

4. 3. Components of lithium-ion battery

Lithium-ion batteries are mainly composed of 4 parts: anode, cathode, electrolyte, and seperator. Normal lithium-ion batteries use graphite for the anote, lithium cobalt oxide(LiCoO2) for the cathode, polyethlene for the sepator, and a mixture of lithium hexafluorophoshate(LiPF6) with an solvent for the electrolyte[14].

(Insert Figure 2 around here)

The safety concerns of lithium-ion battery used in xEV mainly come from the lithium cobalt oxide, which can rapidly heat to 200 â„ƒ. It generates small amount of oxygen as it gets heated. This oxygen could then react with volatilized electrolyte to explode. Therefore, the future research on lithium-ion battery should mainly focus on finding new material that could substitute the lithium cobalt oxide, which is not appropriate for heating environments such as under the hood of a vehicle.

With the necessary technological developments for lithium-ion batteries followed, it is expected that they will constitute 50~70 percent in the xEV market by 2015[15].

(Insert Figure 3 around here)

Samsung SDI has the second largest market share in the world's rechargable battery market with 17 percent. Its technologies for rechargable batteries has been recognized globally. Because of its superior quality of the batteries it produces, it only took 8 years before they became the world's No. 2 lithium-ion battery producer, while most of other pre-existing competitors had been in the industry for more than ten years. In the research conducted by ITT in 2008, Japanese's market research agency, SDI's lithium-ion battery ranks top in not only productivity technology, but also on technical realibility. During April in the same year, SDI's lithium-ion batteries also received Frost & Sullivan award, for its great quality and innovative technology[16].

Samsung SDI established the joint venture with Bosch in June 2008, SB LiMotive, and prepare for the mass production for lithium-ion battery for xEV in the future. They had agreed to invest $500 million by 2013. The venture also planned to release its first lithium-ion battery for HEV in 2010 and achieve 30 percent of global market share by 2015..

5. Competitors Analysis

The competitions are getting more intense between the battery manufacturers of Korea, Japan, and US. While Samsung SDI is No. 2 producer of lithium-ion rechargable secondary battery, it still faces technological difficulties for producing xEV battery because it lacks experience and other

core technologies that other competitors have. Secondary batteries in other electric devices also use lithium-ion battery just as in xEV. The technologies required in xEV battery, however, are tended to be much more delicate and complex. For example, the battery capacity needed for HEV is about 100 times bigger and for EV it is about 500 times bigger than the typical lithium-ion battery capacity found in a celluar phone[17].

5. 1. Domestic and Foreign Competitors

The joint venture between Panasonic and Toyota produce about 67 percent of the global market for hybrid vehicle batteries and 90 percent of the market for NiMH batteries. The venture also supplies its batteries to Toyota’s the current best-selling hybrid in the world, Prius. Panasonic plans to take over Sanyo, which has about 24 percent of global market for xEV batterries. Also Panasonic start constructing for xEV battery production facility, which it spent $1. 1 billion to built.

Sanyo was chosen to supply batteries for the Honda, Vokswagen, and Ford.

The joint venture between Nissan and NEC is building a production facility. Nissan will start selling the Leaf electric vehicles next year.

The largest domestic competitors, LG Chem, also start to build production facility for xEV battery. They plan to invest $862 million by 2013 and their goal is to acheive 20 percent of global market. This new facility will start by next year. LG Chem has other production facility in Korea and here it produces xEV batteries for Hyundai and Kia Motors. LG Chem was also chosen to supply lithium-ion battery for GM and its new electric vehicle, Volt.

It also has plan to build a production facility in Michigan to support US customers[18].

5. 2. Competition Between Nations

Competition over the market for xEV battery is now turning into becoming nations' competition. The U. S. government is most actively fostering for the development of battery for xEV by supporting $ 2. 4 billion to its related industries. They hope to revive its collapsed automobile industry. Japanese government started so-called ' new-generation project for battery development' by supporting $ 233 million over the next seven years. In this project, all major five Japanses automakers, including Toyata, Honda, and Nisan, and major 7 battery manufacturers, and 10 universities participate. South Korea's government decides to support its domestic suppliers about $ 32 million in next 5 years and is also considering tax cuts toward these manufacturers.

If Korean manufacturers were to have competitiveness in future battery market, Korean government needs to take active role in considering the battery's compeititiveness will determine the fate of future automobile industry.

The Federation of Korean Industries(FKI) investigated the competitiveness of the core technology of Korean's lithium-ion battery in Nov 2009. The research revealed that Japanese core technoloty has shown almost twice higher the level. Our core technology is just about 30 percent of Japan's[19]. Competitiveness of materials and parts used in the battery reach only half of

what Japansese has. Only the manufacturing technologies has almost similar competitiveness.

(Insert Table 1 here)

6. Managerial Recommendations

According to the research conducted by the Federation of Korean Industries(FKI) in Nov 2009, Koreans' green car technology falls behind about 5 years when compared to that of other developed countries such as Japan, US, and Germany. Japan has the dominant position in HEV technologies, and Europe and US have advanced technologies in PHEV. Especailly, it is widely recognized that the Japanese technologies for HEV are unchallengeable. Currently, the joint venture between Panasonic and Toyota produces about 67 percent of HEV batteries in the global market. Panasonic is now even trying to take over Sanyo, which is No. 1 rechargeable batteries producer. Their merger will pose threats to many automobile manufactureres as well as battery producers around the world.

Automakers from US and Europe who are planning to introduce xEV out in the market will have to compete directly with Toyota and Honda, who already have dominant positions in the HEV market. For this reason, Korean battery manufacturers may look attractive bacause it can offer US and European carmakers an alternative to relying on Japanese suppliers. This factor can work as an advantage for Korean battery manufactures and they have to use this as much as possible. The battery price is an important factor to be considered when these automakers decide their partnership. For battery manufacturers, this would mean that they have to bring in as many

partners as they can to achieve more economies of scale and lower the price.

GM and BMW already signed a contract with LG Chem and Samsung SDI respectively for the battery supplies for their upcoming xEV projects. However, few big automakers such as Audi, Posche, and Peugeot have not found the battery suppliers for the their upcoming xEV vehicles. If Samsung SDI could make contracts with these automakers, this will help them occupy strategic position in the earkly market for lithium-ion batteries.

Although Samsung SDI’s technologies have the wolrd leadership in manufacturing technology, it is shown that the lack of core technologies and raw materials still pose hindrances to become a industry leader. It needs to actively secure overseas raw materials as well as developing core technologies in long-term perspective.

SB LiMotive, the joint venture between Samsung SDI and Bosch, have become the sole supplier for world renowned premium automaker, BMW. However, because BMW targeting the premium segment, the number of sales that can be expected would be relatively low. Acquiring new customers must be required for SB LiMotive, otherwise it will have damage on cost competitiveness to other battery competitiors in the future. They should pursue efficiencies from manufacturing lithium-ion battery cells in large quantities.

The possible merger between Sanyo and Panasonic will pose new threats to existing automakers and many of them will look for new partnership. This

may provide new opportunities for SB LiMotive to acquire more partnerships for their batteries.

Along with these efforts of acquiring new partnership, SDI needs to increase their investment on technological development to make their batteries more competitive. Among other areas its R&D should mainly focus on these three areas; more improved power density, recharging speed, and meeting the safety standards. Especially, their lithium-ion batteries should be able to resist in high temperatures as well as internal damage from a possible car accident.

The technological aspect of lithium-ion battery is improving rapidly and it’s hard to say which companies will be the first one to produce lithium-ion battery that is ready to be commericalized. However, because of the current high cost of lithiun-ion battery, it will take few more years for the era of xEV to come. Currently, a single battery pack for an electric car can cost more than 10 million won[20].

7. Conclusion

If Korean manufacturers were to have competitiveness in future battery market, Korean government needs to take active role in considering the battery’s compeititiveness will determine the fate of future automobile industry.

Lithium-ion battery still falls behind NiMH batteries in terms of cost and safety and how it can overcome its these disadvantage through technological development is the key to succeed in the xEV battery market.

Acquiring BMW was without a doubt a significant step forward for Samsung SDI. However, because BMW targets the premium segment and sell only small number of cars with premium prices, it would be hard for SB LiMotive to achieve the scale of economies. So SB LiMotive has to obtain more partners to have cost competitiveness in future battery market.

In conducting this job, I think they can use Bosch’s customer relationship trying to expand their partnership.

(Insert Figure 5 around here)

They need to make sure to acquire partnership with Bosch major customers such as Volkswagen and Peugeot. They are planning to release xEV in the future and have not yet found battery suppliers. So SB LiMotive needs to strength their customer base by using cooperation from Bosch for acquiring new customers.

The emergence of small lightweight long-running lithium ion batteries has helped create a makert for notebook computers, cell phone, and other portable devices from the iPod to the BlackBerry. Now, efforts to sclae that technology for use in car batteries could do for the automotive industry what id did for computer and phone companies. The benefit for consumers could be revolutionary.

Apprendix

Figure 1: Comparison of various battery systems

http://e2af. com/trend/images/090220/img_02. jpg

Output density and energy density of various battery systems

Figure 2:

Figure 3:

Figure 4:

Table 1 Comparison of technology by nations

Japan

Korea

China

US

Manufacturing technology

100

100

50

30

Component and Raw material technology

100

50

40

40

Core

technology

100

30

10

80

Source: Korea Electronics Association; KEA