

## Brief Integrative Case 3.2

# Can Sony Regain Its Innovative Edge? The OLED Project

Sony Corporation, once an undeniable innovation leader, has struggled recently to bring new innovative technologies to the market. Sony's next-generation television, an ultrathin model hailed by executives as a symbol of the company's technological comeback, is now a symbol of another kind: the dilemma facing its TV business. The essence of the dilemma involves Sony's ability to hold its position as an innovation leader and stay profitable at the same time.<sup>1</sup>

Sony developed a new flat-panel technology, called organic light-emitting diode (OLED), to produce a brilliant picture on a screen only 3 millimeters thick. The technology is so new that Sony is barely breaking even on the pricey sets.<sup>2</sup> In November 2007, Sony introduced the world's first OLED TV, the 11" XEL-1. Initially priced at US\$2,500, the XEL-1 was more of a prototype than a commercial set. In January of 2009, Sony introduced the new 'X' series OLED Walkman with a 432x240 inch OLED.<sup>3</sup> Despite these two releases, Sony announced it would postpone mass production of the new TV for several years, and halted production of the XEL-1 three years after it was brought to market citing the global downturn.<sup>4</sup> Working in conjunction with Panasonic to jointly develop technologies for OLED TV panel mass production, Sony does not anticipate low-cost mass production by 2013.<sup>5</sup>

The decision to postpone mass production sent a clear message to Sony's engineers and R&D staff that returning its TV business to profitability is a priority. The business is on track to lose money for the sixth straight year. In the past, Sony's engineers could push the company to roll out products that were technological marvels but struggled to turn a profit. Sony's TV division lost 127 billion yen (\$1.34 billion) in 2008, representing more than half of the company's operating losses for the fiscal year which ended March 31, 2009. Televisions accounted for 16.5 percent of Sony's 7.73 trillion yen in revenue.<sup>6</sup>

Sony has a lot to lose. The Japanese electronics giant has invested more than \$78 million in OLED, which it thinks may eventually replace plasma and liquid crystal display (LCD) as the dominant TV technology. According to tech analyst Paul Semenza at researcher iSuppli, 2.8 million OLED TVs will be sold in 2013. That's a promising opportunity for Sony, which has lost market share in music players, video game systems, and other types of TVs in recent years. "Sony desperately needs a new (television)

technology," says Semenza. "They haven't had a blockbuster since the Trinitron" cathode-ray-tube (CRT) televisions of the 1970s, 1980s and 1990s.<sup>7</sup>

According to analysts, Sony was slow to embrace the shift from cathode-ray-tube televisions to LCDs. Once the world's top TV maker, Sony now trails both Samsung and LG in terms of revenue, according to DisplaySearch.<sup>8</sup> And commercialization of this new technology brings about operational and supply chain challenges to the electronic giant: Manufacturing costs for new technology are very high, and the needed components are hard to procure. Research firm DisplaySearch estimates Sony's production yield for its 11-inch OLED panel is below 60 percent, meaning at least 4 of every 10 panels its factories produce aren't up to par and can't be sold. Production of larger panels would likely introduce more difficulties.<sup>9</sup>

### **Sony's New OLED TV Features**

Limited quantities of Sony's first OLED TV model ("XEL-1") came to the U.S. market in January 2008 at strikingly high prices—\$2,500 for a tiny 11-inch TV set.<sup>10</sup> Sony executives tried to persuade the market that the new technology brought so many benefits that it was worth every penny. According to Sony, the main features of the "XEL-1" TV include:<sup>11</sup>

1. **Thinness:** Introduces new TV form factor measuring approximately 3mm thinness (at its thinnest point).
2. **High contrast:** Reproduces realistic images using exquisite shades of black and flexible control of color tone and gradation.
3. **High peak brightness:** Faithfully reproduces picture glow.
4. **Excellent color reproduction:** Delivers pure and vivid colors in both dark and bright images.
5. **Rapid response time:** Smoothly reproduces fast-moving images such as sports scenes.
6. **Low power consumption.**

"The launch of an OLED TV is one of the most important industry landmarks," said Randy Waynick, senior vice president of Sony Electronics' Home Products Division. "Not only does the technology change the form factor of television, it delivers flawless picture quality that will soon become the standard against which all TVs are measured."<sup>12</sup>

Under development for more than 10 years, OLED displays not only offer a striking form factor, they deliver "unmatched performance" in key picture quality categories, according to Waynick. With their light-emitting structure, OLED displays can prevent light emission when reproducing shades of black, resulting in very deep blacks and a contrast ratio of over 1,000,000:1. The lack of a backlight allows the device to control all phases of light emission from zero to peak brightness. The innovative technology delivers exceptional color expression and detail without wasting power, so it is an exceptional energy-saver.<sup>13</sup>

The other advantage of new technology cited by Sony officials is that the OLED display panel uses extremely low power levels since the light-emitting structure of the panel eliminates the need for a separate light source. As a result, OLED panels can be up to 40 percent more efficient per panel inch compared with a conventional 20-inch LCD panel. Additionally, since OLED displays create their own light, any mercury associated with traditional backlighting is eliminated.<sup>14</sup>

"Super Top Emission," a technology unique to Sony and incorporated in its "Organic Panel," has a high aperture ratio which allows for efficient light emission from the organic materials, realizing high peak brightness. This enables "XEL-1" to faithfully reproduce light flow such as reflections of sunlight or camera flashlights through the image reproduced on the display. This "Super Top Emission" and the color extracting technology within its embedded color filter enable "XEL-1" to reproduce natural colors beautifully. As a result, the fresh colors of ripe fruit and shades of deep cobalt blue can be stunningly reproduced. In order to use OLED to generate the full spectrum of Sony's TV color requirements, Sony developed its own proprietary organic materials, with bright coloration. The "Organic Panel" can also sustain its color reproduction capability in scenes of diminished brightness, enabling "XEL-1" to faithfully re-create even dark movie scenes using the colors that were originally intended.<sup>15</sup>

A final advantage of the OLED technology is its rapid response time, enabling it to smoothly reproduce fast moving images such as sports scenes. This response time is attributed to newly developed OLED drive circuits which spontaneously turn the light emitted from the organic material layer on and off.

### **Weaknesses of the OLED Technology**

In spite of all the features that new OLED technology delivers, it has a number of shortcomings, some of which may take years for the manufacturers to overcome in order to make the technology commercially attractive. According to analysts, among the weaknesses of this new technology were the following:<sup>16</sup>

#### 1. *Lifespan*

The biggest technical problem for OLEDs is the limited lifetime of the organic materials. In particular, blue OLEDs historically have had a lifetime of around 14,000 hours to half original brightness (five years at 8 hours a day) when used for flat-panel displays, which is lower than the typical lifetime of LCD, LED, or PDP (plasma display) technology—each currently rated for about 60,000 hours to half brightness, depending on manufacturer and model. However, some manufacturers of OLED displays aim to increase the lifespan of OLED displays, pushing their expected life past that of LCD displays by improving light outcoupling, thus achieving the same brightness at a lower drive current.

#### 2. *Color balance issues*

Additionally, as the OLED material used to produce blue light degrades significantly more rapidly than the materials that produce other colors, blue light output will decrease relative to the other colors of light. This differential color output change will change the color balance of the display and is much more noticeable than a decrease in overall luminance. This can be partially avoided by adjusting color balance, but this may require advanced control circuits and interaction with the user, which is unacceptable for some uses. In order to delay the problem, manufacturers bias the color balance toward blue so that the display initially has an artificially blue tint, leading to complaints of artificial-looking, over-saturated colors.

#### 3. *Water damage*

The intrusion of water into displays can damage or destroy the organic materials. Therefore, improved sealing processes are important for practical manufacturing and may limit the longevity of more flexible displays.

#### 4. *Outdoor performance*

As an emissive display technology, OLEDs are 100 percent reliant converting electricity to light whereas most LCD displays contain at least some portion of reflective technology, and e-ink leads the way in efficiency with ~33 percent reflectivity of sunlight, enabling the display to be used without any artificial light source. OLEDs typically have poor readability in bright ambient light, such as outdoors, whereas displays that use reflective light are able to increase their brightness in the presence of ambient light to help overcome unwanted surface reflections without using any additional power.

#### 5. *Power consumption*

While an OLED will consume around 40 percent of the power of an LCD displaying an image which is primarily black, for the majority of images it will

consume 60–80 percent of the power of an LCD; however, it can use over three times as much power to display an image with a white background such as a document or a website. This can lead to disappointing real-world battery life in mobile devices.

#### Screen burn-in

Unlike displays with a common light source, the brightness of each OLED pixel fades depending on the content displayed. Combined with the short lifetime of the organic dyes, this leads to screen burn-in, worse than was common in the days of CRT-based displays.

### Competition

Development also opens the door to competitors such as LG Electronics Inc. and Samsung Electronics Co. to challenge leadership in a promising technology, touted as a potential replacement to liquid-crystal displays. LG plans to compete with Sony with a 15-inch OLED TV for the Korean and overseas markets. Pricing hasn't yet been determined.<sup>17</sup> Samsung showcased a 31-inch OLED model in January 2008 but said it is a few years away from release.<sup>18</sup> "OLED is probably the best technology we see out there in terms of picture quality," said S. I. Lee, a Samsung senior vice president. But Samsung isn't ready to bring the sets to market. If the 31-inch were commercially available, it would cost \$15,000 to \$20,000, Lee said. "There isn't enough high-definition programming to make such a pricey set worth it," he said. "We want to continue to work on this, bringing the price down to a level that makes sense," he said.<sup>19</sup> Samsung Electronics and LG Electronics, Sony's primary market competitor in this field, introduced a 15-inch OLED television prototype in 2013.<sup>20</sup>

The biggest threat to OLED's future could be LCDs. Prices of LCDs are falling rapidly even as their quality improves. Newer LCD models are thinner, use less energy, and can offer brighter colors. Also, as is often the case with new display technology, producing an OLED television is expensive and the product can cause sticker shock. As we mentioned, Sony's first model, the 11-inch XEL-1, sold for \$2,500—a price reserved for the latest LCD TVs with screens of 50 inches and above.<sup>21</sup>

All new products take time and money to develop, but television technology is particularly difficult. It's complicated and tough to manufacture in large quantities. LCD screens were first tested in the 1970s, but were not commonly used in TVs until 30 years later.<sup>22</sup>

OLED, which goes back to the 1970s, is used in a few niche products today. One of the most common applications is the small, secondary screen on the outside of some flip-phone cell phones. (These relatively low-quality OLED screens usually display the time and date when the phone is closed.) But the technology can't yet produce a TV screen size "at a price that will be accepted by the consumer," says Bob Scaglione, senior vice president at TV

maker Sharp.<sup>23</sup> Analysts forecast that even if OLED does do well, it will be years before it will really take on plasma and LCD. Sizes won't be comparable until 2012 at the earliest.<sup>24</sup> That's why Sharp is betting on LCD. In 2008 the company showed off an experimental, 52-inch LCD that's less than 1 inch thick. Samsung, too, demonstrated thinner, bigger LCDs, including one monster that's 82 inches.<sup>25</sup>

According to Sharp's representatives, LCD has more room to improve. The sets will get at least 40 percent better than they are today as the technology is refined. Such improvements are a moving target that OLED manufacturers must constantly chase. And quickly producing larger OLED TVs is crucial, because everyone is looking for the biggest TV they can afford. The analysts are skeptical that OLED can get there fast enough.<sup>26</sup>

### Sony's Overall Performance

A brief look at Sony's 2009 Annual Report for fiscal year 2008 (year-end of March 31, 2009) shows a grim picture of overall company performance. Sony has been lagging in its core businesses. Electronics and games divisions that together comprise 78 percent of Sony's sales both had posted losses.<sup>27</sup> The 2009 Annual Report outlined a wide array of changes to be implemented over the next couple of years. However, the most recent 2010 Annual Report for fiscal year 2009 (year-end of March 31, 2010) showed only slight improvement.

An analysis of Sony's market performance illustrates many current operational problems, including:

#### 1. Basic profitability problems

Sony's net loss reported in the 2009 Annual Report for fiscal year (FY) 2008 amounted to ¥98.9 billion (approximately \$1 billion). This was Sony's first annual loss in 14 years. For FY 2009, the net loss had been reduced to ¥40.8 (about \$453 million) compared to the prior year.<sup>28,29</sup> The company's FY 2008 year operating loss amounted to ¥227.8 billion.

Among the largest contributors to the loss were (1) the Electronics division with ¥168 billion operating loss (declining earnings from Sony Ericsson mobile phones, VAIO PCs, Handycam video cameras, BRAVIA LCD TVs), (2) the Games division with ¥58.5 billion operating loss (this division had losses for three years in a row), and (3) the Financial Services division with ¥31 billion operating loss. Only Sony's noncore businesses (Sony Pictures and Sony Music, shown in the graphs as the "All Other" division) had operated profitably in 2008–2009.<sup>30</sup> In FY 2009, the company was able to generate a ¥31.8 billion operating income; its revenue-generating forces were again only noncore divisions: Sony Music, Sony Pictures, and Financial Services.<sup>31</sup> Another disturbing sign for the company was a steady decrease in overall sales. Total sales reported for FY 2008 were ¥7.7 trillion (approximately \$86 billion),

down 13 percent from the prior year.<sup>32</sup> For FY 2009, sales dropped further to ¥7.2 trillion.<sup>33</sup>

## 2. Operations and supply-chain problems

Analysts viewed the company's supply chain as too large, complex, and poorly managed. In 2004–2005 Sony tried to optimize its supply chain by reducing the number of suppliers from 4,700 to 2,500.<sup>34</sup> Major restructuring initiatives were announced by new CEO Howard Stringer, the first non-Japanese CEO, after taking the position in 2005.<sup>35</sup> In spite of the restructuring, operations were not synchronized between divisions and departments, and it became apparent that Sony's operations and supply chain needed further improvement.<sup>36</sup> In FY 2008, additional restructuring ambitions were detailed: (1) Cut suppliers from 2,500 to 1,200 by March 2011; (2) place higher volume orders with fewer suppliers to gain more purchasing power and extract better prices; (3) reduce the number of plants from 57 to 49 and outsource a portion of production to low-cost OEM/ODM partners; (4) reduce the workforce by 16,000 (8,000 in the Electronics division); and (5) reorganize/merge several divisions (particularly Electronics and Games divisions) to enhance competitiveness, improve profitability, and accelerate innovation and growth.<sup>37</sup>

## 3. Diversification problems

Many believed the company had become overdiversified, which posed a threat to core business dilution. Many believed the company comprised too many divisions (electronics, games, pictures, music, financial services, etc.) and subdivisions.<sup>38</sup> One example of this problem was mounting losses at Sony's mobile phone venture with the Swedish company Ericsson. Sony recorded equity in net loss of Sony Ericsson of ¥34.5 billion for the fiscal year 2009, compared to a loss of ¥30.3 billion in the prior fiscal year.<sup>39,40,41</sup>

## 4. Misdirected consumer focus

Sony has been frequently criticized for being too focused on the Japanese market and on the consumer segment that is willing to pay a higher price for the product.<sup>42</sup> However, according to the 2009 and 2010 annual reports Sony's sales outside of Japan were 76 percent and 71 percent, respectively.<sup>43,44</sup> While Sony's penetration of global markets is impressive, it is notable that the percentage of sales outside of Japan fell over these two reporting periods. In addition, Sony has been criticized for not meeting consumer expectations and losing market share in different industries. For example, it gave up the lead in personal music players to Apple's popular iPod.<sup>45</sup> Also, it has been struggling to develop a telephone device that can compete with the iPhone.<sup>46</sup> A particularly bitter loss for Sony was when Nintendo outdid Sony's powerful PlayStation

3 video game console with the Wii, a simpler console for novice players.<sup>47</sup> For example, in November of 2006 Sony experienced production constraints with projected components shortages and quality problems. Sony could make only 400,000 units of PS3 in North America compared to Nintendo's 1.2 million due to lack of components for the Blu-Ray drive. In addition, Nintendo was lower priced (\$250 compared to PS3 \$500), which boosted consumer demand during the holiday season.<sup>48</sup>

## Where Did Sony Go Wrong?

Sony's upsetting financial performance in recent years had posed questions about the company's deviation from its image of innovation and excellence. An interesting analysis of the various factors that were pivotal to Sony's leadership success and failure was presented by business and brand strategist Martin Roll.<sup>49</sup> Three major factors contributed to Sony's ascent to global supremacy in the consumer electronics sector:<sup>50</sup>

1. *Innovation.* Innovation, to a great extent, defined the brand character of Sony. Sony grew to global prominence due to its ability to constantly create products even before other companies could conceptualize them. Further, Sony had the ability to sense the hidden consumer demand and create entire product categories through its innovative products. When the Walkman was introduced into the market, there was no existing market for portable music. But Sony's innovative product brought about an entire generation of products and created a new category altogether. Such an innovative culture differentiated Sony from the other consumer electronics brands for a very long time.
2. *Visionary leadership.* Sony is a classic case proving the strategic importance of a visionary leader in carrying a brand to dizzying heights. Sony's management team, along with the CEO, was responsible for creating an environment that nurtured experimentation and innovation. Further, Sony was one of the early Asian brands to recognize the importance of branding, which was again supported and led by the management team.
3. *Pioneer advantage.* Given its innovative edge, Sony emerged as the pioneer in almost every sector that it was operating in. Being the first mover, or in many cases, the inventor of the category, Sony had great leeway in defining the rules of the game, as it were. It set the expectations for the other companies that entered the category. Also, the brand image was enhanced every time a competitor imitated Sony as it became an indirect way to accept Sony's leadership position. Being the pioneer also offered Sony an opportunity to make more mistakes, test new ideas, and experiment with innovative concepts.

Together these three factors were mutually supportive and, in effect, created a virtuous circle. The combination of factors pushed Sony into the exclusive club of iconic brands. But over the last decade, Sony seemed to have lost the magic formula. A number of critical missteps contributed to Sony's decline:<sup>51</sup>

1. *Unrelated diversification.* An important and unique factor that has distinguished several Asian businesses from other Western business is the extent of diversification. Controlled and managed largely by business families, companies blow up into conglomerates that do business in very diverse and unrelated industries. Many Asian companies such as Samsung and LG that have become global forces to reckon with also started as bloated conglomerates. But these companies still focused on core competencies. For example, Samsung trimmed down its organization, withdrew from unrelated industries and channeled its resources around one or two dominant businesses. But Sony stuck to maintaining a presence—even expanding its multiple businesses. In some cases, this kind of unrelated or at best quasi-related diversification can drain the brand's resources and divert focus from the core of the brand.
2. *Innovation shortfall.* The Walkman made Sony the undisputed leader in the portable music player category. As is often the case, success can breed complacency. Sony did not follow up with any outstanding and innovative product lines to sustain the initial success. Apple came out with the iPod, which appealed to the younger generation worldwide, and also established iTunes as the standard from which consumers could download songs for a low price. This not only established Apple as the undisputed leader in the mobile music market but also helped to establish the industry standard. Sony has suffered similar challenges from many brands such as Samsung, Nokia, LG, and others in different product categories. Sony's lack of consumer-oriented innovation has contributed greatly to its decline in recent years.
3. *Lack of brand evolution.* Sony's brand identity surely is informed by an enormous amount of heritage, history, and achievements. But for a brand to be successful in the current ultra-competitive market, it has to make itself very relevant to the current customer segments. Resting on past laurels and expecting customers to support the brand due to its past achievements is not realistic. Sony has not been very successful in evolving as the brand for the masses of the 21st century. Apple, Samsung, and others have appropriated Sony's past position. The Sony brand has not been up with the times, and that has contributed to its slide from the top.

Despite a small profit in 2010, fueled by rising consumer interest in 3-D televisions and price cuts in the PlayStation game series,<sup>52</sup> Sony reported a loss of 520 billion yen for 2011. On April 9, 2012, Sony's chief financial officer Masaru Kato stated that "The situation is critical and we will carry out drastic reform. Nothing is sacred, turning around our TV business is a top priority." It was also reported that Sony may eliminate as many as 10,000 positions, but Kato did not elaborate on the exact number of job cuts. Sony, which had a market capitalization of more than \$125 billion in 2000, is now valued at less than \$19 billion.<sup>53</sup>

Growth for the OLED industry will no doubt be subdued as long as LCD TVs of similar size are selling at a fifth of the cost of OLED sets. Sales projections of OLED TVs are estimated to reach 2.1 million by 2015, as compared to only 34,000 projected for 2012.<sup>54</sup> Growth has also been hampered by excessive inventory, as global TV shipments fell in 2011 for the first time in six years.<sup>55</sup> Whether the OLED project can help bolster this performance and restore the once dominant home and personal electronics company is unclear. Sony has a lot to gain or lose, depending on the outcome.

### Questions for Review

1. Why did Sony push back introduction of the OLED television? What was the advantage in waiting? What were the drawbacks? Was there a threat of moving to market with new technology too fast? How might the delayed introduction affect Sony's reputation among consumers, enthusiasts, and Sony's own R&D personnel?
2. What competitive threats does Sony face? From which companies and geographic regions? How does Sony stack up against these competitors?
3. Is it possible for a diversified company like Sony to be an innovation leader and stay profitable? What does its recent company performance suggest?
4. Should Sony's R&D efforts be focused on a limited number of "core" products or should it aim to be an innovation leader in each single business subsegment that it has? Do you think Sony should subsidize the unsuccessful R&D efforts that produce products which do not turn profits?
5. Do you think excessive diversification is Sony's problem? Do you think the problem is that Sony's products are targeting the upscale high-income consumer group, when most consumers are looking for cheap affordable goods? Why or why not?

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Source: This case was prepared by Tetyana Azarova of Villanova University under the supervision of Professor Jonathan Doh as the basis for class discussion. It is not intended to illustrate either effective or ineffective managerial capability or administrative responsibility.