

## DeBeers's Diamond Dilemma

*David McAdams and Cate Reavis*

*The mystique of natural diamonds has been built by the industry. One hundred fifty million carats of mined diamonds are produced every year, so they are really not that special if you look at those terms.<sup>1</sup>*

—CEO of Gemesis Corporation

*We don't see synthetic diamonds as a threat, but you cannot ignore it completely.<sup>2</sup>*

—Stuart Brown, Finance Director, De Beers

It was early summer 2007 and Lee Mandell decided that the time was right to propose to Diane, his girlfriend of four years. Being the romantic he was, Lee wanted to pop the question over a candle light dinner that included an exceptional bottle of Bordeaux. Logistical details of where to buy the special ring and what type of diamond, however, were less certain in his mind.

Lee and Diane had recently rented the movie *Blood Diamond*, set in Sierra Leone in the 1990s when a civil war was raging and the rebel group, the Revolutionary United Front, relied on proceeds from smuggled diamonds to finance its military operation. The 11-year war, which ended in 2002, resulted in the deaths of tens of thousands and the displacement of more than 2 million people, nearly one-third of the country's population. Both Diane and Lee had been disturbed by the story the movie told, the hardship and violence, the children who were forcibly recruited to fight, and the lives that were

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<sup>1</sup> Karen Goldberg Goff, "Cultivated Carats," *The Washington Times*, February 4, 2007.

<sup>2</sup> Danielle Rossingh, "DeBeers Says it Can't Ignore Synthetic Diamonds," *Bloomberg*, May 17, 2007.

destroyed all over gems that were worn by hundreds of millions of people, men and women alike, throughout the world.

As he thought about his options, Lee recalled a magazine article he had recently read about the growing market for synthetic diamonds. The article described the process by which diamonds could be grown in a laboratory environment, far from the war torn lands of Africa. Chemically, lab-grown diamonds were identical to diamonds that were extracted from the ground. Instead of taking millions or billions of years to form, hundreds of miles underground, however, a laboratory environment could produce a flawless diamond within days.

Lee was starting to think that a synthetic diamond was a great alternative. But how would Diane react upon learning he had bought her a diamond that was made in a laboratory just outside of Boston? Would she be relieved and touched by his humanitarian and eco-friendly purchase or would she wonder if the 20% to 40% he would save by buying a synthetic diamond was an indication of the depth of his love?

For producers of synthetic diamonds, it was consumers like Lee Mandell that proved there was a market demand for an alternative to the natural diamond. But for South Africa-based DeBeers, which up until the late 1990s single-handedly controlled the world's supply of diamonds, Lee's rationale was misguided and he was giving his girlfriend nothing more than costume jewelry. Nevertheless, the fact of the matter was that people were buying lab-produced diamonds and the number doing so was growing at a faster rate than those buying those extracted from the ground.

The dilemma that DeBeers faced came down to whether it should enter the market with its own synthetic diamonds or whether it should have faith that synthetics would be a passing fad and that, at the end of the day, consumers would always prefer buying what, in DeBeers's mind, was the real thing. Complicating the company's dilemma, however, was the fact that it was in the midst of trying to remake its image, tarnished from decades of anti-competitive business practices, to one that was demand driven and focused on brand development. While DeBeers at one time produced 45% of the world's rough diamonds and sold 80% of total supply, by 2007 it was producing 40% and selling just 45%.<sup>3</sup>

Did synthetic diamonds in fact pose a threat to the diamond industry? If so, what should DeBeers's response be, if any?

### **The Diamond Industry**

Natural diamonds, the hardest, most transparent material in existence, were made of carbon atoms that over the course of millions of years and with tremendous heat and pressure deep under the

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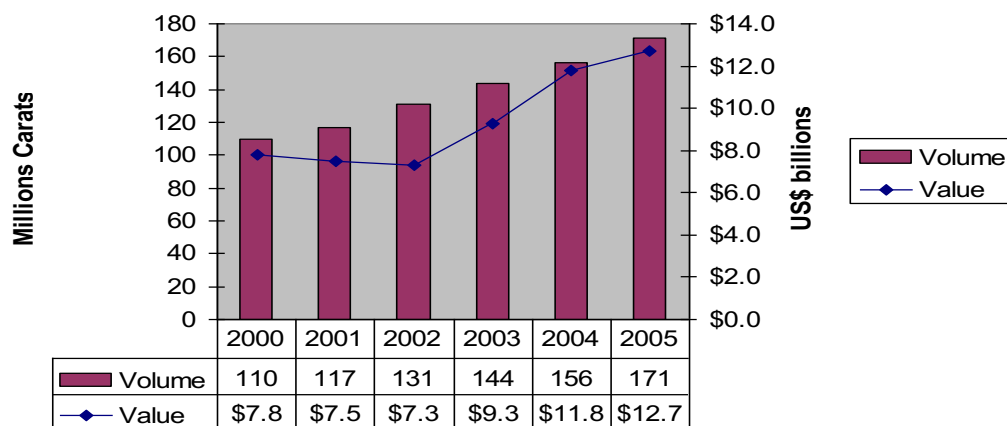
<sup>3</sup> "Diamonds: Changing Facets," *Economist Intelligence Unit*, February 26, 2007.

earth's surface bonded into a cubic structure.<sup>4</sup> Due to their heterogeneity, unlike gold or silver, diamonds were not considered a commodity. As one diamond trader explained, "When you talk about commodities, you know that a ton of copper is worth this much, and an ounce of gold is worth this much because they are homogenous. But diamonds are not homogenous."<sup>5</sup>

### Supply

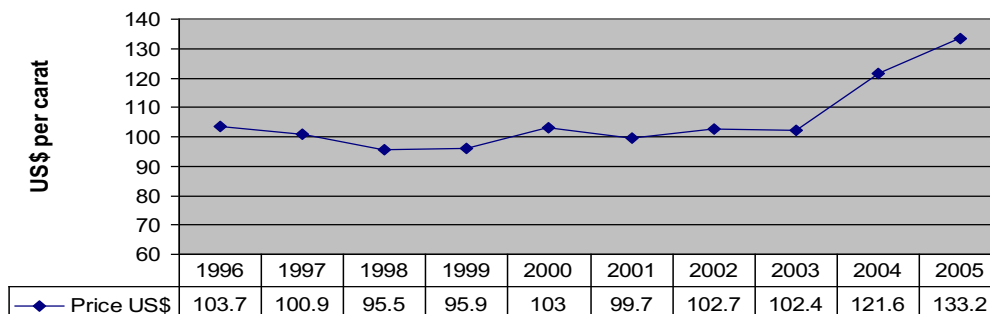
The global diamond industry produced an estimated \$13 billion of rough stones and \$62 billion in jewelry annually. Between 2000 and 2005, world production of diamond rough grew 31% by volume and 70% by value, highlighting the upward trend of diamond prices (Figures 1 and 2).

**Figure 1 Diamond Rough Production by Volume and Value (2000-2005)**



Source: "The Global Gems and Jewelry Industry – Vision 2015: Transforming for Growth," KPMG, December 2006.

**Figure 2 Diamond Rough Prices, 1996-2005**



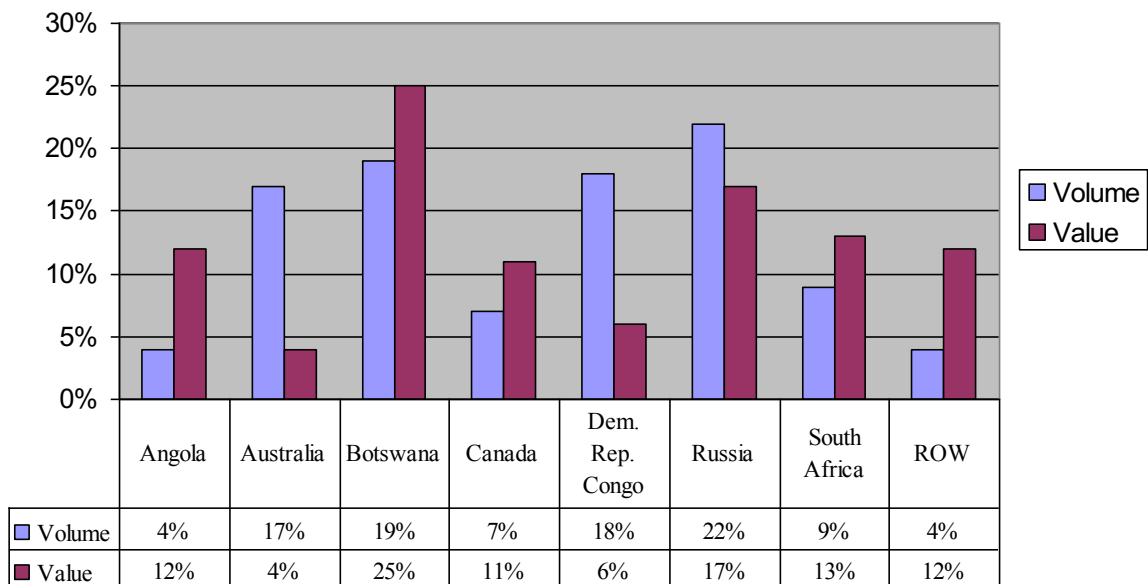
Source: "The Global Gems and Jewelry Industry – Vision 2015: Transforming for Growth," KPMG, December 2006.

<sup>4</sup> Karen Goldberg Goff, "Cultivated Carats," *The Washington Times*, February 4, 2007.

<sup>5</sup> James Dunn, "Glittering Prizes," *The Australian*, October 4, 2006.

Seven countries—Angola, Australia, Botswana, Canada, the Democratic Republic of the Congo, Russia, and South Africa—represented 88% of the value of diamond production and 96% of global production volume.<sup>6</sup> As depicted in **Figure 3**, for some producers, there was great disparity in the relationship between the volume and value of production. While the Congo and Australia were significant producers on a volume basis, the value of their production was quite low. Angola presented the reverse scenario.

**Figure 3** Top Diamond Producers by Volume and Value



Source: "The Global Gems and Jewelry Industry – Vision 2015: Transforming for Growth," KPMG, December 2006.

### Change in Industry Structure

The \$19 billion processing industry (which involved the cutting and polishing of diamonds) was dominated by India. The 1 million people employed by India's processing industry processed more than half of the world's diamonds in value terms, at costs significantly lower than other processing countries—\$10 per carat as opposed to \$17/carat in China, \$40/carat in South Africa and Israel, and \$70/carat in Belgium. Israel and China were the second and third largest processors with 15% and 10% of the market, respectively.<sup>7</sup> But this part of the value chain, at one time dominated almost exclusively by Belgium and Israel, was undergoing significant changes.<sup>8</sup>

<sup>6</sup> "The Global Gems and Jewelry Industry: Vision 2015; Transforming for Growth, KPMG, December 2006.

<sup>7</sup> Ibid.

<sup>8</sup> Ibid.

Since the late 1990s, empowered by DeBeers's shrinking market position, the voices from Southern African countries to keep more of the value added activities such as cutting and polishing in country had become noticeably louder and a number of countries were amending their diamond laws to support and build local diamond-related industries. In 1999, Namibia inserted a clause in a new law permitting the government to force miners to sell a percentage of their diamonds to local polishers,<sup>9</sup> and in 2004, Lev Leviev, an Israeli of Uzbek decent who was one of Israel's largest manufacturers of polished stones, opened the country's first cutting and polishing factory. At the opening of the new factory, Namibia's president was quoted as saying, "To our brothers and sisters of neighboring states, Angola, Botswana, South Africa, I hope that this gives you inspiration to try to imitate what we have here."<sup>10</sup> In 2005, South Africa passed the Diamonds Amendment Act establishing a State Diamond Trader as well as a Diamonds and Precious Metals Regulator. Under the new legislation, scheduled to take effect in 2007, producers would be hit with duties on exported rough diamonds.<sup>11</sup> In response to Southern Africa's attempts to enter into more downstream activities, one industry expert remarked, "There's a political and an emotional point. [Africa] is saying, 'We have these resources as Africans, why are we not able to capitalize on the beneficiation on these resources in our possession? Why are Indians cutting African diamonds?'"<sup>12</sup>

Alongside shifts in the value chain, the industry was experiencing an increasing level of forward and backward integration: mines were integrating forward into retail and retail outlets were integrating backward by investing in mines. In 1999, high-end jeweler Tiffany & Co. announced that it was buying a stake in a Canadian mining concern for \$104 million and would no longer source its diamonds through DeBeers. In 2003, Aber Diamond, a Canadian mining group, purchased U.S. luxury jewelry retailer Harry Winston giving it storefronts in the United States, Japan and Switzerland.<sup>13</sup> In 2005, Russia's mining giant Alrosa opened up a diamond retail store in a shopping complex off Red Square.<sup>14</sup> As DeBeers's CEO remarked, "The verticalization of the industry is clearly its long-term trend; it's absolutely the way to grow a business and build a brand. Retail clearly adds value. But there are several different kinds of know-how involved in the different levels of the chain and you have to respect, and learn, all of them."<sup>15</sup>

## Demand

The United States was far and away the world's biggest purchaser of diamonds accounting for 46% of total demand followed by the Middle East with 12% and Japan with 9% (**Figure 4**). However, demand, particularly for diamonds over 2 carats (worth \$15,000 or more), was soaring in India and

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<sup>9</sup> Nicole Itano, "Looking to Africa to Polish Its Diamonds," *The New York Times*, September 17, 2004.

<sup>10</sup> "The Cartel Isn't For Ever," *The Economist*, July 17, 2004.

<sup>11</sup> John Reed and David White, "Beneficiation: A chance to spread southern African wealth," *Financial Times*, July 14, 2006.

<sup>12</sup> Nicole Itano, "Looking to Africa to Polish Its Diamonds," *The New York Times*, September 17, 2004.

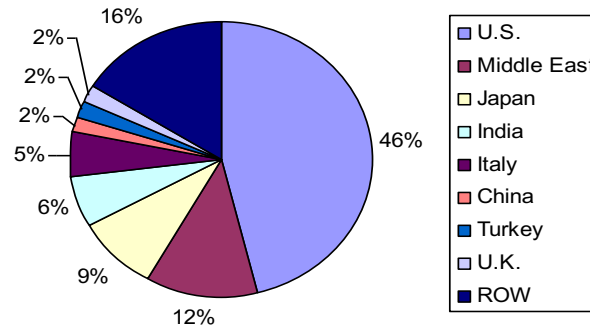
<sup>13</sup> Danielle Cadieux, "DeBeers and the Global Diamond Industry," *Ivey Case Study No. 9B05M040*, 2005.

<sup>14</sup> Ben Aris, "A Diamond in the Rough," *The Moscow Times*, September 11, 2001.

<sup>15</sup> Vanessa Friedman, "The New Rocks on the Block," *Financial Times*, May 10, 2006.

China<sup>16</sup> in concert with increasing disposable incomes and a growing middle class. India was the fastest growing diamond jewelry market with a growth rate of 19% in 2005.

**Figure 4** World Sales of Diamonds, 2005 (polished wholesale price)



Source: "The Global Gems and Jewelry Industry – Vision 2015: Transforming for Growth," KPMG, December 2006.

While at one time the diamond industry was supply-side driven, with little attention given to the end consumer, by the late 1990s the industry began focusing more on the demand side. The main catalyst for this shift was DeBeers's decision to conduct business in a whole new way.

### DeBeers Under Attack

In the early 1990s DeBeers ruled the diamond industry. While it only produced 45% of the world's rough diamonds, it sold 80% of the total supply from its marketing unit in London. Its market dominance enabled its Central Selling Organization to choose whom to sell to, how much to sell, and at what price. Buyers who turned down an offer to purchase a parcel of diamonds might not be invited to purchase from DeBeers again. Meanwhile, buyers who strayed from DeBeers's selling arm and purchased directly from a mine would be dropped by the company or financially punished.<sup>17</sup> In 1981, after Zaire decided to stop selling its industrial-grade diamonds to the syndicate, DeBeers dipped into its stockpile and flooded the market bringing down the price of Zairian diamonds by 40%.<sup>18</sup>

DeBeers's monopoly was shaken in the 1990s from the emergence of three producers that fell outside of its grasp, making its strategy of controlling supply costly both financially and legally. The first big hit came shortly after the collapse of the Soviet Union in 1991. Through a marketing agreement that dated back to the late 1950s when diamond deposits were first discovered in Siberia, the Soviets

<sup>16</sup> James Dunn, "Glittering Prizes," *The Australian*, October 4, 2006.

<sup>17</sup> Danielle Cadieux, "DeBeers and the Global Diamond Industry," *Ivey Case Study No. 9B05M040*, 2005.

<sup>18</sup> Debora L. Spar, "Continuity and Change in the International Diamond Market," *Journal of Economic Perspectives*, Volume 20, Number 3, Summer 2006.

had sold their entire diamond production to DeBeers's Central Selling Organization. Once the Soviet system disintegrated, however, DeBeers was unable to enforce contracts and Russian diamonds were soon being smuggled onto the international market causing prices to fall.

But DeBeers's challenges in Russia could not be blamed solely on the country's economic and political upheaval. Lev Leviev, one of Israel's largest manufacturers of polished stones, was making his move in Russia where he was well connected politically. In 1989, two years after Leviev became a sightholder for DeBeers, Russia's state-run diamond mining and trading group, now known as Alrosa, entered into a joint venture with Leviev to establish the country's first cutting factory, the stones of which would be supplied directly by Russian mines, not through DeBeers.<sup>19</sup> The partnership marked the first time in which rough diamonds were cut in their country of origin. Over the next five years, Leviev's position in the Russian diamond industry grew to the point where, in 1995, DeBeers terminated his sightholder status.<sup>20</sup>

The second jolt to DeBeers's position came in 1996 with the decision by Australia's Argyle diamond mine, which produced low quality diamonds suitable for inexpensive jewelry, to terminate its contract with DeBeers and begin marketing its own diamonds. It sold 42 million carats directly to polishers in Antwerp that year.<sup>21</sup>

Finally, the emergence of Canada in the early 1990s as a diamond producer served as a further threat to DeBeers's position. While the company was successful in acquiring stakes in a couple of Canadian mines, the majority of the country's production fell outside of its control.

In order to keep prices high, therefore safeguard its market dominance, DeBeers was forced to both hold back a large portion of its diamonds from the market and purchase much of the excess supply from these producing countries often at inflated prices. By the end of the 1990s, DeBeers's market share had fallen from 85% to 65% while its diamond stockpile had grown from \$2.5 billion to \$5 billion. Between December 1989 and 1998 DeBeers's share price fell from \$17 to \$12, a nearly 30% drop.<sup>22</sup>

In addition to the financial sting DeBeers was feeling resulting from its supply-side strategy, antitrust regulators in the United States and the European Union were becoming increasingly aggressive in their attempts to formally end the company's price control practices. In a 1994 indictment, the United States accused DeBeers of violating the Sherman Antitrust Act by fixing the price of industrial diamonds. The government contended that a subsidiary of DeBeers conspired with General Electric, another producer of industrial diamond products, to fix the world prices of industrial diamonds in

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<sup>19</sup> "The Cartel Isn't Forever," *The Economist*, July 17, 2004.

<sup>20</sup> Phyllis Berman and Lea Goldman, "Cracked DeBeers," *Forbes.com*, September 15, 2003.

<sup>21</sup> *Ibid.*

<sup>22</sup> Nicholas Stein, "The DeBeers Story: A New Cut On An Old Monopoly," *Fortune*, February 19, 2001.

1991 and 1992. While the United States Justice Department was unable to prosecute DeBeers because its operations were overseas and it refused to subject itself to the jurisdiction of an American court, the company was prohibited from conducting business in the United States.

On a completely different front, DeBeers faced yet another threat, which was quickly turning into a public relations nightmare for the entire diamond industry. In the mid-1990s, Angola, the world's third largest producer of rough diamonds, was overrun by rebel forces opposed to President Dos Santos. Gaining control of the country's diamond supplies, the rebels flooded the market with up to \$1.2 billion worth of rough diamonds. To maintain control over supply, therefore prices, DeBeers had little choice but to buy what were becoming known as "blood diamonds," the proceeds of which went toward financing the armed conflict. Angola was not a lone participant in the blood diamond trade. Rebel forces in Sierra Leone, Liberia, and the Democratic Republic of the Congo were also using the illicit diamond trade to finance their respective armed conflicts.

DeBeers's involvement in the "blood diamond" trade was exposed in a 1998 report by Global Witness which accused the company of "operat[ing] with an extraordinary lack of accountability."<sup>23</sup> As Martin Rapaport, publisher of the diamond industry pricing guide, asked rhetorically, "How can it be that tens of millions of dollars are exported from diamond areas and yet there is no electricity, no plumbing, no wells, no improvement in the lives of the people?" Rapaport went on to ask the more complicated question of, "Do we owe anything to the people of Africa just because we buy their diamonds? Are we responsible for what we buy?"<sup>24</sup>

For DeBeers, these challenges and threats in aggregate were creating a "*perfect storm*" of sorts. Significant changes to the company's strategy that had served it well for decades had to be made.

### A New Direction

In 1998, on the advice of U.S. consulting firm Bain and Company, DeBeers decided to "ditch its role of buyer of last resort" and develop a strategy that was demand-driven and brand-focused whereby profits were more important than market share.<sup>25</sup> When explaining its strategic shift, DeBeers's Managing Director stated, "We don't have to go rushing about the world trying to buy every diamond. What is the point of us buying diamonds close to or over our selling prices? It's silly. I'm perfectly happy to market 60%. What I want to do is differentiate the portion that does come to us and create value on those goods...in order to sell them first, more advantageously, and at better prices."<sup>26</sup>

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<sup>23</sup> Phyllis Berman and Lea Goldman, "Cracked DeBeers," *Forbes.com*, September 15, 2003.

<sup>24</sup> Kate Reardon, "Guilt Free Diamonds Sparkle Brighter for Ethical Shoppers," *The Times*, June 17, 2006.

<sup>25</sup> "The Cartel Isn't For Ever," *The Economist*, July 17, 2004.

<sup>26</sup> Nicholas Stein, "The DeBeers Story: A New Cut On An Old Monopoly," *Fortune*, February 19, 2001.



As a part of its strategy, DeBeers ended its practice of stockpiling diamonds, stopped buying diamonds on the open market, and began only selling diamonds from its own operations which enabled it to guarantee that its supply was “conflict free.” The company promised the European Union it would stop buying diamonds from Alrosa, the state-owned Russian firm that accounted for 20% of global production by 2009 to promote competition.<sup>27</sup> The promise was formalized in a 2006 agreement with Russia.

A new demand-centered strategy required that DeBeers build new relationships with its suppliers. This came about in what was dubbed the “Supplier of Choice” program, the goal of which was to make DeBeers the supplier of choice in the eyes of its customers, in lieu of the buyer of last resort. DeBeers scaled down the number of its sightholders from 120 to 80 and formalized business relationships with those that were chosen with a written contract.<sup>28</sup> Sightholders were no longer expected to purchase whatever stones DeBeers offered to them. Rather, they requested a specific package of stones based on sales and marketing strategies they had created.<sup>29</sup> The criteria to being a sightholder were no longer based on financial strength and manufacturing capabilities but rather marketing savvy.

Under the new arrangement, sightholders were entitled to use DeBeers’s Forevermark, a tiny logo that was etched into natural diamonds which guaranteed the polished diamonds were natural, ethically traded and non-treated. (The Forevermark diamond was sold in Hong Kong, China, Japan, and India.) Sightholders also benefited from DeBeers’s marketing data including consumer buying habits and patterns and the number of engagements worldwide. Those sightholders that successfully built strong brands were partially reimbursed for the money they spent on advertising and marketing efforts. As Nicky Oppenheimer, DeBeers’s chairman, explained, “We want people to say, ‘While I can get diamonds from people other than DeBeers, the package DeBeers gives me is so valuable, I get a better return from them.’”<sup>30</sup> Accompanying DeBeers’s efforts at building a new identity, the company’s Central Selling Organization was renamed the Diamond Trading Company (DTC).

In step with the Supplier of Choice Program, DeBeers developed a marketing and retail strategy to position its diamonds as a branded luxury item. Unlike other luxury brand producers, diamond producers had suffered from poor financial performance over the years due to the lack of branding. In fact, many in the industry lamented that although not traded as one, diamonds had become a commodity of sorts. Lev Leviev implied that DeBeers was largely responsible: “There are two main reasons why diamond retailers fail. Lack of innovation—they have the same stones in the same settings in the window year after year—and dependence on one supplier for their stones. You can

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<sup>27</sup> “Diamonds Get Their Sparkle Back,” *New Zealand*, February 26, 2007.

<sup>28</sup> Danielle Cadieux, “DeBeers and the Global Diamond Industry,” *Ivey Case Study No. 9B05M040*, 2005.

<sup>29</sup> Debora L. Spar, “Continuity and Change in the International Diamond Market,” *Journal of Economic Perspectives*, Volume 20, Number 3, Summer 2006.

<sup>30</sup> Nicholas Stein, “The DeBeers Story: A New Cut On An Old Monopoly,” *Fortune*, February 19, 2001.

never plan your sales even one year ahead, because you can only work with what they give you, and they decide.”<sup>31</sup>

A Boston-based diamond wholesaler, however, had proven that branding diamonds could work, especially since the market was shifting to a demand-driven model. In 1997, the wholesaler, who sourced his raw stones from DeBeers sightholders and others, began selling a branded diamond called Hearts on Fire which was differentiated by its cut. Marketed as “the world’s most perfectly cut diamond,” the diamonds were cut by hand in Antwerp, Belgium in a pattern known as “hearts and arrows.” When viewed under magnification, each diamond revealed a symmetrical ring of hearts and eight pointed arrows.<sup>32</sup> The brand produced \$40 million in sales each year. In 1999, DeBeers entered into the brand world by marketing a limited-edition (20,000 stones) Millennium diamond, engraved with the company’s logo and the year 2000. The Millennium diamond’s campaign came with a tag line of, “Show her you’ll love her for the next thousand years.”

DeBeers’s brand positioning was accompanied by attempts to widen its customer base. A number of non-wedding advertisement campaigns were launched including the “Celebrate Her” campaign, which urged men to show their love for their significant other by buying her a three-stone diamond ring. The campaigns’ advertisement pictured a middle-aged man on bended knee asking, “Will you marry me again?” There was the “Women of the World Raise Your Right Hand” campaign, which encouraged women to indulge in a diamond ring to be worn on their right hand as an expression of personal style.<sup>33</sup> In addition to new messages enticing consumers to buy diamonds for purposes other than engagements, in 2001, DeBeers entered into a joint venture with LVMH to open up a series of retail stores. Diamond jewelry was sold under the DeBeers name. By early 2007, DeBeers had 22 stores spanning the United States (3), Europe (4), the Middle East (1), and Asia (14).

### From Public to Private

At the same time the new strategy was being rolled out, DeBeers delisted from the Johannesburg Stock Exchange where it had traded since 1893. Purchased by a consortium that included the Oppenheimer family, Anglo American plc, and Debswana Diamond Co. (Pty) Ltd, DeBeers became the world’s largest private diamond mining company. The privatization, which cost \$17.6 billion (a 31% premium)<sup>34</sup>, left DeBeers heavily in debt. Ironically, the terrorist attacks in the United States on September 11, 2001 helped alleviate the company’s debt. As DeBeers’s Chairman Nicky Oppenheimer explained, “Sentiment changed dramatically after September 11, though we did not realize it at the time. There was a swing back to traditional values such as family and all the sorts of things that diamond jewelry plays into.”<sup>35</sup>

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<sup>31</sup> Vanessa Friedman, “The New Rocks on the Block,” *Financial Times*, May 10, 2006.

<sup>32</sup> Greg Gatlin, “Branding Becomes Gen of an Idea,” *Boston Herald*, February 11, 2001.

<sup>33</sup> Danielle Cadieux, “DeBeers and the Global Diamond Industry,” *Ivey Case Study No. 9B05M040*, 2005.

<sup>34</sup> David McKay, “A Private Life: Oppenheimer at 60,” *miningmx.com*, July 4, 2005.

<sup>35</sup> Brendan Ryan, “Nicky Oppenheimer, Private Treasure,” *Financial Mail*, August 30, 2002.

One of DeBeers's first major media grabbing acts as a private company came in 2004 when it pleaded guilty to charges of price-fixing of industrial diamonds and agreed to pay a \$10 million fine. Settling the 10-year old charges meant that DeBeers executives could visit and conduct business in the United States. In 2005, the company agreed to pay \$250 million to settle a class action suit by diamond consumers who accused the company of monopolizing the international diamond business through its control of mines and agreements with diamond suppliers around the world.

In 2006, DeBeers made another surprising move when it signed an agreement with the Botswana government to establish the Diamond Trading Company Botswana. The 50:50 joint venture would start sorting and valuing all of the diamond production of Debswana (50:50 partnership between DeBeers and the Botswana government) likely at the end of 2007 or early 2008 upon completion of a \$83 million complex near the capital's airport. From 2009, the partnership would take over aggregation duties (mixing of diamonds from different countries into similar assortments) of DeBeers's entire aggregation operation, currently carried out by DeBeers's DTC in London. As a result of the deal, Botswana had moved up the value chain from mining and sorting to sales and marketing.<sup>36</sup> As of 2006, four international diamond businesses had cutting factories and 11 new licenses had been issued. By some estimates, 3,500 new jobs would be created. Costs of cutting and polishing, however, would likely be significantly higher than they were in India and China.<sup>37</sup>

In early 2007, DeBeers signed a similar agreement with the Namibian government. All diamonds produced by their joint venture, Namdeb, would be sorted in Namibia and just under 50% of output, worth \$300 million, would be sold locally.<sup>38</sup>

While DeBeers was reorganizing its traditional operations and making various amends, a new potential competitor to the natural diamond quietly began to emerge: laboratory-grown or, as DeBeers would call them, "synthetic" diamonds.

### **Enter Synthetic Diamonds**

Unlike a cubic zirconium which was altogether a different chemical substance, synthetic diamonds were chemically identical to the mined variety.<sup>39</sup> Nearly \$50 million worth of synthetic diamonds were sold each year and analysts predicted the market would grow at a CAGR of 45% until 2015, by which time sales would exceed \$2 billion.<sup>40</sup> In 2006, 400,000 synthetic diamond carats were produced in the United States and prices rose 20%. "We are selling all that we can produce," admitted one synthetic producer.<sup>41</sup>

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<sup>36</sup> John Reed and David White, "Beneficiation: A chance to spread southern African wealth," *Financial Times*, July 14, 2006.

<sup>37</sup> David White, "A Question of Profile Image and Status," *Financial Times*, June 20, 2006.

<sup>38</sup> "Diamonds Get Their Sparkle Back," *New Zealand Herald*, February 26, 2007.

<sup>39</sup> Elsa Wenzel, "Synthetic Diamonds Are Still a Rough Cut," *CNET News.com*, February 14, 2007.

<sup>40</sup> Melvyn Thomas, "Lab Tag for Synthetic Diamonds," *The Economic Times*, May 19, 2007.

<sup>41</sup> Karen Goldberg Goff, "Cultivated Carats," *The Washington Times*, February 4, 2007.

There were a handful of synthetic diamond producers in the United States including Adia Diamonds (Michigan/Ontario), Gemesis (Sarasota, Florida), Apollo (Boston, Massachusetts), Chatham Created Gems (San Francisco, California), and an outfit called Life Gem (Chicago, Illinois) that created lab-grown diamonds with the carbon from a person's ashes. The company's slogan was "Love knows no boundaries; love knows no end." A 1-carat diamond from Gem Life sold for \$13,000.<sup>42</sup> Producers typically retailed their collections through a wide variety of jewelers spread mainly throughout the United States. Apollo was scheduled to begin selling its diamonds via its website some time in 2007.

While there was no disagreement over the fact that, chemically speaking, synthetic diamonds were equal to their natural counterparts, there was disagreement within the industry over what to call them. Preferring the term "cultured," synthetic manufacturers objected to the term synthetic, used by various industry groups including the European Gemological Laboratories, as consumers could very well associate it with imitation stones. The Gemological Institute of America, the organization responsible for developing the color, cut, clarity and carat standards for diamonds back in the late 1950s, used terms synthetic, man-made and laboratory grown interchangeably.

The diamond industry was appealing to the U.S. Federal Trade Commission to prohibit laboratory diamond producers from calling their products "cultured", suggesting that synthetic be the formal descriptor. Their fear was that the natural diamond industry could suffer the same fate as natural pearls did as a result of the introduction of cultured pearls in the early 1900s. According to Gem World International, cultured pearls accounted for more than 95% of all pearls sold globally.<sup>43</sup> "It's essential that synthetics are readily detectable from diamonds and that clear, unequivocal language is used to describe these man-made products," noted a DeBeers spokeswoman.<sup>44</sup>

## Process

The technology used to make lab-grown diamonds had been around since 1955 when General Electric began making industrial diamonds used to cut hard substances such as stones, ceramics, metals, and concrete.<sup>45</sup> DeBeers followed suit and also began making industrial diamonds and, in the late 1950s, DeBeers's Chairman Harry Oppenheimer let it be known that the company would not produce synthetic stones unless it became economically necessary.

There were two types of processes for producing synthetic diamonds. The first process, called high pressure high temperature (HPHT), involved mixing a microscopic diamond grain with graphite and metal and placing the mixture into a 4,000-pound machine the size of a kitchen oven. The grain, put under pressure equal to 58,000 atmospheres and exposed to 2,300 degrees Fahrenheit (close to the

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<sup>42</sup> Ibid.

<sup>43</sup> Vanessa O'Connell, "Gem War," *The Wall Street Journal*, January 13, 2007.

<sup>44</sup> Ibid.

<sup>45</sup> Ibid.

melting point of steel), would then grow one atom at a time.<sup>46</sup> It typically took four days to grow a 2.5 carat diamond and approximately 20 kilowatts of energy was used per carat.<sup>47</sup> HPHT was the process General Electric used starting in the 1950s to manufacture industrial diamonds.

The second process was known as chemical vapor deposition (CVD). A more modern and delicate process than HPHT, CVD used a combination of carbon gases, temperature and pressure that replicated conditions present at the beginning of the universe. Atoms from the vapor landed on a tiny diamond chip placed in the chamber. Then the vapor particles took on the structure of that diamond — growing the diamond, atom by atom, into a much bigger diamond. The process could be tweaked to produce diamonds other than those used for jewelry. For instance, by adding enough boron to allow the diamond to conduct a current, the CVD process could turn a diamond into a semiconductor.<sup>48</sup> In 1996, Robert Linares, founder of Apollo Diamond Inc., received a patent for the CVD process he had developed for producing flawless diamonds. As one diamond scientist exclaimed upon putting a CVD diamond under a microscope, “It’s too perfect to be natural. Things in nature have flaws. The growth and structure of this diamond is flawless.”<sup>49</sup>

Unlike their natural counterparts, the majority of synthetic diamonds came in colors—yellow, green, pink, orange, and blue— filling a market niche. Colored natural diamonds, formed by impurities in the earth (e.g., nitrogen-yellow, boron-blue, natural radiation-green<sup>50</sup>) were rare and therefore prohibitively expensive for most consumers. “The market wants more fancy [colored] diamonds, so this is what we’ve decided to concentrate on,” explained the CEO of Gemesis.<sup>51</sup> Although possible, manufacturing colorless diamonds (a process that entailed removing the nitrogen from yellow stones) was an expensive process.

One challenge the industry faced was that none of the synthetic manufacturers had found a way to produce a synthetic diamond bigger than 1 carat for the jewelry market.

### Why Buy Synthetic?

Laboratory diamond producers focused on the financial, environmental and political advantages that their product had over natural diamonds. Synthetic diamonds cost anywhere from 15% to 40% less than naturally mined diamonds and sometimes considerably less for colored stones. As **Table 1** below shows, a one-carat natural pink diamond could cost upwards of \$100,000, while its synthetic counterpart would retail for around \$4,000.

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<sup>46</sup> Danielle Rossingh, “Diamonds by Linares,” *Bloomberg.com*, July 5, 2007.

<sup>47</sup> Elsa Wenzel, “Synthetic Diamonds Are Still a Rough Cut,” *CNET News.com*, February 14, 2007.

<sup>48</sup> Kevin Maney, “Man Made Diamonds Sparkle with Potential,” *USA Today*, October 6, 2005.

<sup>49</sup> Joshua Davis, “The New Diamond Age,” *Wired*, September 2003.

<sup>50</sup> “Diamonddaze,” *South China Morning Post*, November 19, 2004.

<sup>51</sup> Victoria Finaly, “Diamonds Are No Longer a Girl’s Best Friend,” *The Daily Telegraph*, December 22, 2006.

**Table 1**                      **Natural vs. Lab-Made Diamond Price Comparisons**

	Natural	Lab-Made	Cubic Zirconia
<b>Colorless Stones</b>	1 carat = \$6,800-\$9,100	½ carat = \$900-\$2,500	1 carat = \$5 - \$15
<b>Colored Stones</b>	1 carat = \$9,000 (yellows) - \$100,000 (pinks)	1 carat = \$2,000-\$7,000	1 carat = \$10 - \$15

Source: Vanessa O'Connell, "Gen War," *The Wall Street Journal*, January 13, 2007.

Environmentally, compared to a natural diamond which required several hundred tons of earth be extracted for each carat<sup>52</sup> often at the expense of both human and animal habitats, lab-grown diamonds were considerably more eco-friendly. According to the Canadian Arctic Resources Committee, as far as 200 kilometers downstream from the lake where Canada's Ekati diamond mine sat, environmental destruction, particularly of fish habitats, was seen in numerous lakes and streams. Diamond mining had also taken a toll on land-based wildlife habitats. Scientists had observed that caribou and grizzly bears were spending far less time feeding in areas around the mines. Meanwhile diamond mines required the use diesel fuel to operate, adding to the production of greenhouse gases.<sup>53</sup>

More than their financial and environmental advantages, lab-grown diamond producers emphasized the political advantages of buying a synthetic diamond, namely that consumers would in no way be at risk of acquiring a "blood diamond." A growing number of customers wanted to know where their diamonds came from and wanted a guarantee that they were clean. Once cut and polished, however, it was impossible for consumers to tell which diamonds were blood diamonds. All distinguishing characteristics which identified a diamond's country of origin were washed away with the polishing process.<sup>54</sup>

Measures had been taken by the diamond industry and various governments to assuage agitated consumers and curtail the number of blood diamonds that circulated on the open market and by 2006 blood diamonds made up a mere 1% of the overall diamond trade.<sup>55</sup> Much of this success was attributed to the Kimberley Process Certification Scheme, introduced in 2002 as an attempt by the industry to monitor its own abuses, and as a way to avoid a wide spread consumer boycott. The 70 countries that participated in the Kimberley process could only trade with other participants who met the minimum standards. Each participant pledged to prevent the trade of conflict diamonds by implementing stricter monitoring practices which included shipping all diamonds in tamperproof containers with certificates verifying they came from a legitimate source. (**Exhibit 1** provides more details on requirements.) Everyone who handled a diamond was responsible for maintaining an identity tag affixed to the stone from the time it was extracted from the ground.<sup>56</sup> Non-compliers were punished. The Democratic Republic of the Congo was ousted in 2004 and Venezuela was

<sup>52</sup> Elsa Wenzel, "Synthetic Diamonds Are Still a Rough Cut," *CNET News.com*, February 14, 2007.

<sup>53</sup> [http://www.carc.org/mining\\_sustain/diamonds\\_arent.php](http://www.carc.org/mining_sustain/diamonds_arent.php)

<sup>54</sup> Sharon Barker, "Diamonds in the Rough," *The Jerusalem Post*, April 6, 2001.

<sup>55</sup> Vivienne Walt, "Diamonds Aren't Forever," *Fortune*, December 11, 2006.

<sup>56</sup> Debora L. Spar, "Continuity and Change in the International Diamond Market," *Journal of Economic Perspectives*, Volume 20, Number 3, Summer 2006.

threatened with suspension in 2006 after reporting that it had no diamond exports for 2005. The process, however, was far from perfect and enforcement was proving to be next to impossible. As one example, Sierra Leone, which accounted for up to 33% of the world's smuggled diamonds, had a mere 200 monitors for the entire country sharing 10 USAID-donated motorcycles.<sup>57</sup>

However, some in the industry felt the Kimberley process was working and that the human rights argument could in fact hurt those it intended to help. As one industry observer stated, "When you're buying mined diamonds, you're helping communities in Africa. When you're buying them made from a machine, you're helping 20 guys in Florida."<sup>58</sup> One international diamond trader took issue with this sentiment stating that working conditions for many Africans involved in the mining business remained appalling, opining, "Conflict-free diamonds should not be confused with ethical diamonds."<sup>59</sup>

A new selling point for the synthetic diamond industry came in early 2007 when the Gemological Institute of America's Synthetic Diamond Report began grading the quality of lab-grown diamonds using the same 4-Cs (cut, carat, color, clarity) rating system used for natural diamonds. Certification papers would now accompany synthetic diamonds just as they did natural stones and would include a note stating, "This is a man-made diamond and has been produced in a laboratory."<sup>60</sup> GIA's public benefit mission required it to "describe and report on synthetics so that consumers can rely on full and proper disclosure" upon entering the marketplace.<sup>61</sup>

## Beyond Jewelry

Whether or not synthetic diamonds would make a significant dent in the natural diamond market was still unclear. But many in the industry believed that due to the chemical composition of the diamond and its ability to be used in a wide array of industries, synthetics would inevitably have a bright future beyond the jewelry industry. As microprocessors became hotter, faster, and smaller in accordance with Moore's law, diamonds could be used as a substitute to heat sensitive silicon. Diamond microchips could handle extreme temperatures allowing them to run at speeds that would liquefy ordinary silicon. As a professor of materials science from MIT explained, "If Moore's law is going to be maintained, processors are going to get hotter and hotter. Eventually silicon is just going to turn into a puddle. Diamond is the solution to that problem."<sup>62</sup>

Up until the recent improvements in laboratory technology, there had been three main barriers to using diamonds as an input to semiconductors. First, diamonds had always been viewed as too expensive to use in such a scaled up way. Synthetic diamonds helped address that problem. Second,

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<sup>57</sup> Vivienne Walt, "Diamonds Aren't Forever," *Fortune*, December 11, 2006.

<sup>58</sup> Elsa Wenzel, "Synthetic Diamonds Are Still a Rough Cut," *CNET News.com*, February 14, 2007.

<sup>59</sup> "Diamonds: Changing Facets," *Economist Intelligence Unit*, February 26, 2007.

<sup>60</sup> "GIA Launches Synthetic Grading Report," *Modern Jeweler*, January 1, 2007.

<sup>61</sup> *Ibid.*

<sup>62</sup> Joshua Davis, "The New Diamond Age," *Wired*, September 2003.

there had never been a steady and consistent supply of large pure diamonds. One mined diamond did not necessarily have the same electrical properties as the next. CVD produced diamonds solved that problem. Finally, prior to the new processes used for lab created diamonds, no company or individual had been able to manufacture a negative charged diamond with sufficient conductivity needed to form microchip circuits.<sup>63</sup>

Alongside their use in the semiconductor industry, the thermal conductivity, hardness and transparency of diamonds made them an attractive component for next-generation optics, digital data storage,<sup>64</sup> as well as for biological purposes including skin implanted electrodes due to their ability to resist corrosion from acids and other organic compounds.<sup>65</sup>

The market for industrial diamonds was growing at 10% to 15% a year.<sup>66</sup> Synthetic diamonds accounted for 90% of the industrial market.<sup>67</sup> As the CEO of synthetic diamond manufacturer Apollo remarked, “Man-made diamonds will be with us in many different ways that we can only begin to imagine right now that will materially affect everybody on the planet.”<sup>68</sup>

### **DeBeers Responds**

Although DeBeers maintained a fairly nonchalant attitude about the emergence of jewelry-grade synthetic diamonds, there were two ways in which the company was attempting to protect the future of the natural diamond. One way was through its Gem Defensive Programme. In the early years, DeBeers warned jewelers about the arrival of synthetic stones and in 2000 the company began supplying gem labs, at no charge, with machinery designed to distinguish man-made from natural stones. Many synthetic manufacturers, however, were proactively supporting DeBeers’s detection efforts by lasering the words “lab-created” on their diamonds. DeBeers had spent \$17 million on research to differentiate natural and synthetic diamonds.<sup>69</sup>

A second defensive strategy focused on consumer education. In anticipation of the movie *Blood Diamond*, DeBeers launched a completely different kind of diamond advertisement campaign than those of the past. In lieu of the glitzy pictures of model-esque women donning the perfect sparkler, the ads focused on how the industry provided mining communities with access to employment opportunities, schools for its children, and access to anti-HIV drugs for its mine workers, giving off the general sentiment that buying a diamond from Southern Africa was “an act of altruism.”<sup>70</sup>

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<sup>63</sup> Ibid.

<sup>64</sup> Elsa Wenzel, “Synthetic Diamonds Are Still a Rough Cut,” *CNET News.com*, February 14, 2007.

<sup>65</sup> Alice Park, “Diamonds De Novo,” *Time*, February 12, 2007.

<sup>66</sup> Ibid.

<sup>67</sup> “Diamonds: Changing Facets,” *Economist Intelligence Unit*, February 26, 2007.

<sup>68</sup> Elsa Wenzel, “Synthetic Diamonds Are Still a Rough Cut,” *CNET News.com*, February 14, 2007.

<sup>69</sup> Danielle Rossingh, “DeBeers Says it Can’t Ignore Synthetic Diamonds,” *Bloomberg*, May 17, 2007.

<sup>70</sup> Victoria Finlay, “Diamonds Are No Longer a Girl’s Best Friend,” *The Daily Telegraph*, December 22, 2006.



For the most part, however, DeBeers was fairly quiet about the potential threat posed by synthetic diamonds. As a DeBeers spokesperson put it, “Synthetics and diamonds are very different products. Diamonds are unique, ancient, natural treasures—the youngest diamond is 900 million years old.”<sup>71</sup> Believing that the “real thing” would trump synthetics, the company was actively searching out new supplies of natural diamonds. In 2004, the company discovered 39 new diamond deposits and signed marketing agreements with producers in Canada, Botswana, India, Democratic Republic of the Congo, the Central African Republic, Russia, Australia, Brazil, and Madagascar.<sup>72</sup>

## Conclusion

Lee Mandell walked up to the counter in one of the more reputable jewelry stores in Boston. The salesman asked if he would like some help. Lee responded that he was shopping for an engagement ring but was uncertain as to whether he was in the market for a natural or a synthetic diamond. With a look of utter horror on his face, the salesman said, “You simply can not give your girlfriend a synthetic. I won’t let you. The appeal of a diamond is its age and where and how it was created. Where is the romance in something created in a lab by a cold, metallic machine? Besides, the synthetics don’t come in sizes larger than 1 carat and I can tell that you want something grander for your loved one.”

The jeweler’s response was not totally convincing to Lee. His mind kept drifting back to that article he had read about the emerging synthetic diamond industry and the rationale one distributor gave for buying a lab-made diamond: “If you go into a florist and buy a beautiful orchid, it’s not grown in some steamy hot jungle in Central America. It’s grown in a hothouse somewhere in California. But that doesn’t change the fact that it’s a beautiful orchid.”<sup>73</sup>

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<sup>71</sup> Amy Keller, “Carat Factory,” *Florida Trend*, August 1, 2007.

<sup>72</sup> Debora L. Spar, “Continuity and Change in the International Diamond Market,” *Journal of Economic Perspectives*, Volume 20, Number 3, Summer 2006.

<sup>73</sup> Joshua Davis, “The New Diamond Age,” *Wired*, September 2003.

### **Exhibit 1      The Kimberley Process Certificate**

Each Participant should ensure that:

- (a) a Kimberley Process Certificate (hereafter referred to as the Certificate) accompanies each shipment of rough diamonds on export;
- (b) its processes for issuing Certificates meet the minimum standards of the Kimberley Process as set out in Section IV;
- (c) Certificates meet the minimum requirements set out in Annex I. As long as these requirements are met, Participants may at their discretion establish additional characteristics for their own Certificates, for example their form, additional data or security elements;
- (d) it notifies all other Participants through the Chair of the features of its Certificate as specified in Annex I, for purposes of validation.

### **Undertakings in respect of the international trade in rough diamonds**

Each Participant should:

- (a) with regard to shipments of rough diamonds exported to a Participant, require that each such shipment is accompanied by a duly validated Certificate;
- (b) with regard to shipments of rough diamonds imported from a Participant:  
require a duly validated Certificate;  
ensure that confirmation of receipt is sent expeditiously to the relevant Exporting Authority. The confirmation should as a minimum refer to the Certificate number, the number of parcels, the carat weight and the details of the importer and exporter;  
require that the original of the Certificate be readily accessible for a period of no less than three years;
- (c) ensure that no shipment of rough diamonds is imported from or exported to a non-Participant;
- (d) recognise that Participants through whose territory shipments transit are not required to meet the requirement of paragraphs (a) and (b) above, and of Section II (a) provided that the designated authorities of the Participant through whose territory a shipment passes, ensure that the shipment leaves its territory in an identical state as it entered its territory (i.e. unopened and not tampered with).

### **Minimum requirements for Certificates**

A Certificate is to meet the following minimum requirements:

- Each Certificate should bear the title "Kimberley Process Certificate" and the following statement: "The rough diamonds in this shipment have been handled in accordance with the provisions of the Kimberley Process Certification Scheme for rough diamonds"
- Country of origin for shipment of parcels of unmixed (i.e. from the same) origin

## DEBEERS'S DIAMOND DILEMMA

David McAdams and Cate Reavis

- Certificates may be issued in any language, provided that an English translation is incorporated
- Unique numbering with the Alpha 2 country code, according to ISO 3166-1
- Tamper and forgery resistant
- Date of issuance
- Date of expiry
- Issuing authority
- Identification of exporter and importer
- Carat weight/mass
- Value in US\$
- Number of parcels in shipment
- Relevant Harmonised Commodity Description and Coding System
- Validation of Certificate by the Exporting Authority