

Sustainable Value Chain Management in the Diamond Industry – The Case of Samarth Diamond

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Chapter 1

Introduction

The diamond industry produces sophisticated luxury products through a global value chain with a wide variety of players, benefitting a demanding customer base but also causing several ethical issues in indigenous countries. From being formed in and mined from the deeper layers of our planet, the journey of a diamond is fascinating. It comprises many steps and involves different types of organizations. It is also a cyclical industry prone to global events such as financial crises or the ongoing pandemic.

More than 90% of diamond manufacturers in the world are family-owned SMEs in India. Thus, when the global economy collapses, or the markets decline, they find their survival threatened. In this case, we focus on Samarth Diamond, one such family firm operating in the Indian diamond industry. With its headquarters located in India, the company today also has presence in various other countries through subsidiaries or stand-alone businesses. It can be considered one of the top 1% firms in the Indian industry along several criteria. But the company's journey has not been easy.

Our teaching case will introduce the various aspects of the diamond industry, including its value chain, and outline the major problems that exist in the industry regarding sustainability and ethics. Then we present the history of Samarth Diamond, how it had faced challenges during the 2007-2008 financial crisis and how it had emerged as a successful company when the majority of the industry was closing down. From doing contract-based "job work" for other companies to becoming its own manufacturing company, the growth of Samarth Diamond can be attributed to two main factors: its approach towards technology and its attitude towards employees.

With hefty investments in technology and capitalizing on their goodwill and name in the market, Samarth Diamond had succeeded to make an effective transformation. From becoming the first to introduce the famous "*single package system*" in the small diamond category to becoming an organization with more than 4,500 employees, 3 factories, and 3 international offices, Samarth Diamond is an example of family firms surviving and succeeding with grit, skill, and passion as well as risky decisions to adopt new technologies.

We will look at how Samarth Diamond implements its human resource policies, specifically from an ethics and sustainability perspective. The company prides itself on the commitment and loyalty of its employees and considers it a core factor that helped the company survive any crisis. As such, it is interesting to see how a family owned firm manages its people and achieves a level of sustainability that does not just meet CSR definitions but also translates into strategic competencies. Moreover, both technology adoption and employee management are intricately linked in the company's everyday operations.

Given that the majority of diamond manufacturing firms are family-owned Indian SMEs, both the adoption of technology and the move towards sustainability and ethics are quite slow. Samarth Diamond is an example of how sustainability can be integrated into the company to realize the triple-bottom line goals of profits, planet, and people.

Chapter 2

Diamond industry

The life of a diamond begins in the deeper layers of Earth where, over 3 billion years ago, under intense heat and pressure, the carbon atoms crystallize to form diamonds. These diamonds are available today at a depth of around 150-200 kms where the temperatures average 900-1,300 degrees Celsius and the pressure is 45-60 kilobars which is around 50,000 times that of atmospheric pressure on earth's surface. Diamond mining companies dig and mine the diamonds from the rocks in these layers. At this stage, the diamonds are dirty with several blemishes and impurities. They cannot be outright used in jewelry. They do not even look beautiful! So, they are called *rough diamonds*.

Exhibit 1 shows the four parts of the global diamond industry value chain: rough diamond mining, diamond manufacturing, diamond jewelry manufacturing, and diamond jewelry retail.

The mined diamonds are sold to diamond manufacturers. This process occurs through various channels which we will describe later. These diamond manufacturers cut and polish the rough diamonds into polished diamonds. Around 90% of diamond manufacturers operate in India today. They manufacture mostly smaller sized diamonds while larger stones are processed in countries like China, Israel, the US and Europe. The finished diamonds then reach jewelry manufacturers who set diamonds into pieces of jewelry like rings, necklaces, chains and earrings, which are finally sold to end consumers through retail.

Diamond mining

The upstream mining operations comprise a handful of companies mining for rough diamonds in the extremely difficult mines located across the world, mainly in Russia, Canada, Australia, and the African countries of Botswana, Democratic Republic of Congo (DRC), South Africa, and Zimbabwe. Approximately 130,000,000 carats or 26,000 kgs of rough diamonds are mined annually with a total value of around nine billion US\$. Around 50% of diamonds originate from African countries. Exhibit 2 displays a map of major mining countries. You can also watch a short video on how diamonds are mined here¹.

Russia leads the pack by mining around 43 million carats of gem quality diamonds in 2018 with an estimated market value of US\$22billion (NS Energy 2020²). US Geological Survey (USGS 2020³) puts this number at 25 million carats in 2019. The second major producer is Botswana with 18 million carats mined in 2019 (USGS 2020). While Botswana might be second by weight, it is the leading country in the world by value because the rough diamonds mined here are both larger and have better quality than those mined in Russia. Diamond mining is an important industry

1. You can copy and paste this link if clicking on the hyperlink does not work:
<https://www.youtube.com/watch?v=ucaVEIjiZ58>.
2. <https://www.nsenerybusiness.com/news/top-diamond-mining-countries-world/>
3. Mineral Commodity Summaries 2020: U.S. Geological Survey, January 2020

for Botswana as it constitutes 25% of the country's GDP and 60% of its exports (NS Energy 2020, USGS 2020). Distribution of the countries by weight can be seen in exhibit 3.

The mining companies are just a handful, with De Beers, ALROSA, Rio Tinto, Dominion Diamond, and Petra Diamonds being the major players. With 16-20% operating margin, mining is the most profitable part of the diamond industry. De Beers is the global leader in mining and the sale of mined diamonds through its subsidiary Diamond Trading Company that sells to only a few companies called sight holders that it handpicks. De Beers mines some 40% of annual diamond production and predominantly operates in South Africa, Botswana, and Canada. Two of the three currently active mines in Canada are owned by De Beers while Dominion Diamond owns the third mine. De Beers also markets approximately one third of DRC's diamonds. The mining however is done by a joint venture between the DRC's government and a Belgian company Sibeka in which De Beers has a 20% stake (NS Energy 2020). ALROSA is another large mining company, a close next to De Beers. It is a group of companies mainly operating in the Russian mines. Various government agencies and organizations own approximately 80% of stake in ALROSA. Rio Tinto exclusively operates in Canada and Australia. Petra Diamonds mines in South Africa, Tanzania, and Botswana.

Mining is an investment intensive activity due to the high costs needed to secure a mine and mine the rough diamonds. The mines are usually of two types: *open pit* where the stones are mined in the relatively top layers of the ground and *underground* where the stones are mined in deeper layers of the ground. Around half of mines active today are underground mines. Though it costs more to mine in underground mines than it does in open pit mines, the quality of stones mined in underground mines is higher which balances out the costs. ALROSA's annual statement indicates that around 34% of costs are related to labor wages and staff costs while 20% accounts for depreciation of the mines and mining material as mining is a long-running activity. Calculating the actual cost of mining is very difficult as mining companies do not disclose this. From ALROSA's annual statement, it can be assumed that the cost of mining is less than US\$100 per carat of rough diamonds mined but because millions of carats are mined throughout the lifetime of a single mine, the actual cost of mining is very high.

Diamond manufacturing

The middle market of the diamond industry includes manufacturing of both diamonds and diamond jewelry. This is where thousands of companies operate for a very little operating margin of 1-8%. It is mostly wholesalers and traders who buy rough diamonds in one of the six major hubs of the diamond industry: New York, London, Moscow, Mumbai, Hong Kong, and Antwerp. The rough diamonds are also bought directly from mining companies in tenders, auctions, or by sight holders. Wholesales and traders stock the rough diamonds and sell to processing companies that cut and polish diamonds. Sometimes wholesalers and diamond traders cut and polish diamonds themselves or let smaller companies do the job for them on a fixed-price contract-basis which is commonly called as "job work".

Diamonds are the hardest known natural materials in the world. Such hard diamonds are available in the mines as bulky, chunky deposits with no shape, masked colors, and clarity that cannot be easily determined by the naked eye. As such, diamonds are mined in a rudimentary form and are called “rough diamonds”. These are converted into polished, finished gems that we buy in stores through multi-step processes of “cutting” and “polishing”. Though diamonds are extremely hard, they are also extremely brittle and can be split by a single blow. This requires immensely delicate procedures, skills, and experience. The angles of the facets in the final gem form determines its shine and, what is known as, its clarity. This video⁴ and this shorter one by CNN⁵ show the step-by-step process of how a diamond is cut and polished.

Cutting rough diamonds into polished diamonds results in around 50% of weight loss. This means diamond manufacturing requires precise skills and technological expertise so as to minimize this loss. Special x-ray diffraction machines are used to see the underlying crystal orientation of the rough diamond. This is used to determine the optimal cutting directions. Most rough diamonds contain visible inclusions and flaws. When cutting the rough diamond, the cutter must decide which flaws are to be removed by cutting and which could be kept. Then the diamonds are cut by an automated laser cutting machine.

Once a diamond is cut, it goes through the polishing process. Polishers gradually remove remaining blemishes and flaws through gradual, time consuming erosion process. The polishing process is pretty much routinised and the finished polished diamonds are sold to jewelry makers, wholesalers and retailers. Thus, the entire diamond manufacturing process is a manual-intensive activity where rough diamonds are sorted based on their quality, evaluated and planned to minimize wastage, cut and polished, and eventually turned into finished diamonds. Even though modern technologies have eased the manufacturing process, using these technologies and machinery requires a steep learning curve. As such, the human element remains paramount in diamond manufacturing.

Diamond jewelry manufacturing

Within the second part of the middle market, the diamond jewelry manufacturing industry, there are many companies across the world that purchase polished diamonds from the processing companies and make jewelry and other accessories with them. Most of these companies are still family owned but there are also major global players like Tiffany and Co., Van Cleef & Arpels, Cartier and Bulgari. Many local brands exist in different countries too. Similar to rough diamonds, the trade of finished diamonds also takes place across the six major hubs. In Antwerp alone, more than

4. You can copy and paste this link if clicking on the hyperlink does not work:

<https://www.youtube.com/watch?v=XZ-8US5tQNo>

5. Shorter one by CNN: https://www.youtube.com/watch?v=5OLI_Pthu0o

90% of rough diamonds and 50% of finished diamonds are traded. The diamond manufacturers in countries like India, Israel and China sell to middlemen, wholesalers, and traders through direct channels who then sell the polished diamonds in their offices in one or more of these hubs. Some manufacturers also establish offices in these hubs to be closer to the international clients. Wholesalers who purchase diamonds in these hubs take them back to their countries to sell to smaller players through direct trading or trade shows.

11 different grades of diamonds can be manufactured: I1, I2, I3 (included diamonds with visible inclusions), SI1 and SI2 (slightly included with inclusions noticeable at 10x magnification), VS1 and VS2 (very slightly included with *minor* inclusions visible at 10x), VVS1 and VVS2 (very very slightly included with miniscule inclusions difficult to see even at 10x), IF (internally flawless with only small surface blemishes that might be visible under a microscope), and FL (flawless with no inclusions or blemishes at all are present either internal or external to the gem. Less than 1% of gems are FL as it is rare to find stones with no inclusions at all.

The world-renowned jewelry brands use only the top grades of gems, i.e., FL to VVS, and India manufactures more than two thirds of top-quality gems in the small size while countries like the USA and several European countries deal in larger sizes. China is slowly picking pace in cutting big size diamonds. Understandably, the price of a diamond increases as the grade increases. SI and VS grades are preferred by middle class customer segments in developing countries like India while VS and VVS are considered top quality. IF and FL are quite rare to be found in most of the jewelry brands. In Western markets, most high-end jewelry and watch brands use VVS to IF stones. Watches use exclusively small stones for obvious reasons of size and space restrictions. Pieces of jewelry like necklaces, bangles and bracelets use small to medium size stones while rings can use any size. For engagement rings, the price increases as the size of the stone(s) increases but, from the popular media, there is a perception that the bigger the stone is the more the bride-to-be prefers, and this obviously affects the pricing of the rings with bigger stones.

Diamond jewelry retail

Finally, the third part comprises the downstream market of jewelry sales or retail. Several companies purchase manufactured jewelry from the middle market and sell them to end consumers in retail with an operating margin of 11-14%. Alternatively, some national and international brands manufacture and sell their own jewelry in their own retail stores thus blurring the lines between middle and downstream markets.

Ethical and environmental concerns in the diamond industry

In 1866, the first known diamond was found in Kimberley, South Africa, when a 15-year-old boy discovered the 21.25 carat Eureka diamond on the banks of the Orange River. This saw the formation of the De Beers Consolidated Mines Limited, the company that would eventually become De

De Beers, the largest diamond mining and trading company in the world. They would go on to run a heavy marketing campaign to create the perception of beauty and value and love among the general public and give rise to the diamond jewelry industry as we know it today.

The mines had dried up and mining had halted in Kimberley later on and the company moved to Botswana. The diamond processing as we know it today began in 1928 but, as it was not cost competitive, it did not achieve scale. By 2008, there were only 3,000 polishers across the world and the “diamond beneficiation” program was launched to train and increase the number of polishers. However, this program has failed and there are only a handful of polishers across the world today, with the majority of them in India. Similarly, jewelry manufacturing efforts had also failed because of the lower cost of labor in countries like India and China.

Because most of the mines are in underdeveloped African countries, there have long been several ethical and human rights issues associated with mining. Anyone who had seen the movie *Blood Diamond* would be aware of the issues related to exploitation of labor and local communities, deterioration of the natural environment, and money laundering. Mining companies used to move the rough diamonds to developed countries in Europe or the USA or to the emerging countries of Israel or India for further manufacturing. There were no benefits to the local communities or the host countries. In contrast to the safe and well established structures and practices in mining in developed countries as shown in the video before, this video⁶ shows a different reality in countries like Sierra Leone where even basic security measures are not taken.

On the other hand, the African governments themselves did not contribute to the protection of the interests of their countries and population. In Tanzania, mining companies were declaring less volume of mined diamonds and avoided paying the duty that was supposed to be paid by the international companies operating in the country. Poorly implemented laws and uncertainty in the investments led to companies to not taking interest in doing business in the country. In Zimbabwe, a similar level of lack of transparency prevailed as billions of dollars had vanished before they reached the country’s treasury. Much of this amount was used by the secret services and the military to finance their own activities. In Angola and DRC, diamond deposits led to more poverty, violence, corruption, and oppression. But, seeing all these issues, Botswana learned from its neighbors and kept a part of the diamond processing within the country. The generated profits were used to provide free school education to local communities, establish road, telephone and internet networks, and develop infrastructure.

Overall, a report by ABN AMRO in 2017⁷ shows that social costs in most African countries are high, including insufficient wages, child labor, forced labor, and occupational health and safety risk. Some environmental costs include exploitation of scarce energy materials, air pollution,

6. You can copy and paste this link if clicking on the hyperlink does not work:

<https://www.youtube.com/watch?v=TSV4CE7stt4>

7. ABN AMRO 2017: https://www.abnamro.com/en/images/Documents/040_Sustainable_banking/Publications/Report_The_True_Price_of_Diamonds.pdf

water pollution, extensive water usage and deterioration of the local flora and fauna. As awareness about the environmental and economic exploitation in the mining countries increased, and governmental and non-governmental organizations put pressure on mining companies to act in an ethically responsible manner, mining companies today keep some diamond processing in local markets. The indigenous population in host towns and villages receive education; schools, hospitals and infrastructure are established to both contribute to the local communities and the maintain of trade relationships between local governments and global diamond miners. However, there is still much more to be done as most of the mining companies do the bare minimum to keep the human rights organizations, local governments, international institutions, and activists at bay.

Today, end consumers are more and more demanding ethical transparency. For a diamond to be called ethically sourced, it should carry information about its movement throughout the value chain, i.e., since it was mined to how it had moved through the middle market and ended up with the retailer. As such, every company across the value chain should adhere to strict tracing requirements to render every single diamond ethically sourced and sustainably manufactured. There are a few ways to ensure a diamond is ethically sourced including the renown ForeverMark and CanadaMark, the former certified by De Beers and the latter by the Canadian program to guarantee ethically and sustainably sourced diamonds. In the USA, the GIA oversees this process while many countries that agreed to the United Nation's Kimberly Process also use Kimberley Process Certificates.

A recent change in the global diamond industry is the introduction of synthetic or lab-made diamonds. As of 2010, while 65 million carats of natural diamonds are mined for industrial use per year, five billion carats of synthetic diamonds are created for industrial use. Even end consumers, mostly the younger generation, who want to be sustainable and avoid any form of exploitation associated with natural diamonds, may it be in the mining stages or in the processing, tend to prefer synthetic diamonds. This is resulting in an increased demand for synthetic diamonds in the luxury industry as well. Growing synthetic diamonds in the lab is still an energy intensive process, requiring an average of 26 kWh of energy to grow 1 carat of rough diamonds in the lab. Yet this is lower than the average of 57 kWh of energy required to mine natural diamonds (ABN AMRO 2017). Most lab-grown diamonds are produced in China.

As growing larger size synthetic diamonds becomes costly, natural diamonds remain the only option when it comes to large sized stones beyond 1 to 1.5 carats. However, this may change in the future as companies are developing technologies to grow large synthetic stones as well. For instance, in May 2015, a 10.02 carat diamond was cut from a 32.2 carat synthetic rough diamond grown in the lab in 300 hours⁸. Since 2018, De Beers has also started selling jewelry-grade synthetic diamonds along with those for industrial applications. Its website prices synthetic diamonds at

8. Company Grows 10 Carat Synthetic Diamond. Jckonline.com (May 27, 2015). Retrieved on September 1, 2015: <http://www.jckonline.com/2015/05/27/company-grows-10-carat-synthetic-diamond>

US\$200, 400, and 800 for a quarter, half, and a full carat stone respectively. These prices are about one-tenth of the price of a similar naturally mined rough diamond⁹. On an average, for a similar grade, a lab-made diamond would cost between 20-40% less than its natural counterpart.

Though the actual price of buying a synthetic diamond might not be the real motivator for people to prefer lab-made diamonds to natural diamonds, which is in fact reflected in the fact that not many consumers are still inclined to buy synthetic diamonds, there are other obvious benefits. The major one includes low social and environmental costs. As synthetic diamonds are not mined, the health and safety risk to the mining employees and exploitation of labor are no longer a problem. However, problems like child labor and low wages still remain as they do in any manufacturing industry, especially because the majority of synthetic diamonds are manufactured in China. The environmental impact of land exploitation and direct pollution is less but high energy consumption and high water usage still remain.

The adverse environmental events resulting in brittle financial situation of consumers across the world, their changing tastes and preferences in luxury and gifts, and the rising concerns towards the unethical approaches of the diamond industry players at different stages of the value chain led to the global diamond industry seeing a decline in the demand for diamonds of any form, even so for naturally sourced diamonds.

India and the diamond industry

India has a long tradition of and association with diamonds. Diamonds were first discovered in India in the 4th century BC. They were found in the country's rivers and streams, and later in some world renown mines such as the Golconda mine. India was also the first major diamond consumer. In fact, Indian rulers and royalty used to wear a lot of diamond jewelry. As trade between India and Europe increased, diamonds found their way into the clothes and jewelry in the royal courts in Europe and became fashionable for the society's important people by the 1400s. Because of the high demand for Indian diamonds, the diamond mines in India had run out by the 1700s or early 1800s. India was in fact the leading producer of diamonds until the 18th century. It had created some of the finest diamonds in the history, from Darya-e Nur, Nur-Ul-Ain, Kohinoor, Hope and Regent, the last three of which were taken by the UK during their rule in India. Exhibit 4 shows pictures of these diamonds and their whereabouts. This age-old association with diamonds had made India naturally the skilled and efficient manufacturing power in the diamond industry. When asked why India has so many skilled employees who could work on diamonds, one of Samarth Diamond's employees commented, "Architecture is in our DNA. When you look at all the skilled designs [buildings and monuments], you can see that. We also have great patience".

9. But De Beers only sells these diamond set in jewelry. So, the price also includes that of the jewelry but as only low quality jewelry options are available, the majority of the price can be attributed to the synthetic diamonds.

While the Indian diamond industry was initially a very unorganized sector, with several small, family-owned companies scattered across the country, 1909 saw the rise of a relatively more organized sector when some Indian diamond polishers decided to formally organize the diamond industry. The Indian Diamond Export Corporation was founded which was the first sight holder for De Beers in India (All Diamond 2015). The Indian diamond manufacturers initially produced only low-quality diamonds intended for the US market.

But when new mines were discovered in Australia in 1985, a lot of rough diamonds found their way into the Indian market which drove the development of the industry as a whole, with increased workforce and infrastructure. Local banks assisted with financing and companies adopted new technologies and machinery to move from small workshops where diamonds were cut and polished manually to large factories where manual labor was combined with technological skills. As most of the Indian diamond merchants came from the state/region of Gujarat, Surat, one of the major cities in that state, had eventually become the world's largest diamond manufacturing center. Mumbai saw the establishment of headquarters and corporate offices of these processing and manufacturing companies due to the facilities it offered for exporting internationally. This expansion did not stop there; the Indian diamond industry expanded to Belgium with many companies establishing offices in Antwerp due to the ease of and being close to the procurement of rough diamonds.

While Indian manufacturers created low or medium quality diamonds initially, with the new skills and technology, they started creating all sorts of diamonds, in all shapes and sizes and grades. By the 1990s and early 2000s, Indian diamond industry was creating very high-grade diamonds and dethroned Israel as the world's largest diamond exporter. In 1980s, tensions ensued between India and Israel. While Israel was the global leader in cutting and polishing of diamonds, India was suddenly taking over. Israel had raised allegations that India was using child labor to flood the market with cheap products. But an independent audit by A.F. Ferguson had found no evidence for the support of the accuse. Eventually India had become the global leader in manufacturing diamonds with Mumbai as one of the world's six major hubs for diamond trading¹⁰.

As such, India is today the largest importer of rough diamonds and the largest exporter of polished diamonds in the world. India has 60% market share by value, 80% by volume, and 92% by quantity of stones. To put it simple, 14 out of 15 diamonds are manufactured in India, i.e., the entire requirement of the world diamond market is addressed by India. Thus, it provides employment to many Indians. The industry is also highly organized today with the Gem and Jewelry Export Promotion Council (GJEPC) coordinating the interests of the government and the industry. The Hindustan Diamond Company Private Limited, a joint venture between the Ministry of Trade and Industry and De Beers group, set up in 1978, is a De Beers sight holder and supplies large quantities of rough diamonds to SMEs in India. By the early 1900s, Indian economy too saw free market policies which increased the middle-class population and the demand for diamond jewelry. India is also

10. Others include London, Antwerp, Moscow, New York, and Hong Kong.

the world's third largest market for diamond consumption, after the US and China (IBEF 2015¹¹). While other countries like China had tried to enter this market, none of them had the skills and capabilities Indian workers had. Bigger diamonds made with robots or automation can be manufactured in any country. But for diamonds of high quality where precision in processing and careful and experienced handling is required, India is still leading. India also produces synthetic diamonds but they account for just over 2% of Indian gem and jewelry exports to the US totaling US\$14billion.

11. <https://www.ibef.org/archives/detail/bmV3cyYzNzc3MDk0JjQzOA==>

Chapter 3

The history of Samarth Diamond

The beginnings

Samarth Diamond was founded in 1987 by Dinesh Patel in the town of Visnagar located in the northern part of the state of Gujarat in India. The company started with just two diamond cutting machines and ten employees. Coming from an agricultural family, Dinesh did not have enough of his own money to start the business. He borrowed money from private people at high interest rates as was the norm in India. For two years, Dinesh struggled to manage the business with high interest loans to repay. Then his elder brother, Dashrath Patel, joined the company after working in the construction industry for a few years. He started managing the financial aspects of the company thus freeing his brother to focus on what he was best at: the manufacturing process. Dashrath had taken a loan from the Gujarat State Financial Corporation and repaid the private loan taken by Dinesh. He also repaid the loan taken from the Gujarat State Financial Corporation. Since the Corporation experienced that several upcoming companies in the diamond industry did not repay loans on time, Samarth Diamond's reliable behavior guaranteed them quick access to any further loans required for the diversification and growth of the company.

In 1995, the last and the youngest brother, Govind Patel, after several years of professional experience and having completed his MBA from Pune, India, decided to join the family business. His skills had brought several administrative and innovative changes in the company. Perhaps one of the most important changes were his move to Mumbai in 1996 and establishing the corporate headquarters.

The threat to the status quo

Since its inception, Samarth Diamond has mainly been doing "job work". It means that they received rough diamonds from bigger trading and wholesaling companies, then cut and polish the diamonds for them, for which Samarth Diamond would receive a fixed fee. Job work was a common practice in the industry as the thousands of smaller companies did not have enough capital or managerial expertise to manage the entire business on their own. Some of the major companies that provide job work to smaller companies are Living Stones, Dimexon, Lakhi Gems, Param Diamond, Mahendra Brothers, Nipun International, Asian Stars, Suresh Brothers, and, the most important of them, Jasani Group.

As a foretelling of what was to come, in 2001, the attacks on the World Trade Center happened and the global financial markets have experienced a hit. Due to the recession and lack of capital Jasani Group filed bankruptcy. Instead of paying Samarth Diamond for the job work of processing a large quantity of rough diamonds, Jasani Group asked them to keep the diamonds in the place of the money. As the market was down Samarth Diamond could not sell the diamonds¹². The

12. This was such a large quantity that Samarth Diamond would go on to sell it in parts for the next 4-5 years whenever the market was good.

brothers succeeded in securing work from other companies in the market and continued to struggle to survive until 2008 when the main challenge for Samarth Diamond occurred. The 2008 financial crisis severely impacted many industries across the world and the diamond industry was not an exception. Being luxury products, diamonds felt the burn as demand took a plunge and many companies in the industry had shut down. All the major companies for whom Samarth Diamond was doing job work had cut down more than 50% of work. With the problem of liquidity and no demand in the market, Samarth Diamond found itself in a threatening situation. The company had around 1,200 employees in the Visnagar factory and at least 800 of them faced the risk of downsizing. As production went down, fixed overhead expenses mounted and the brothers were challenged with two options: to shut down completely like other companies were doing and lead to 800 families coming onto the streets, or to move beyond job work and start their own manufacturing.

The decision

Two major factors went into the decision-making process for the Patel brothers. Firstly, shutting down business completely meant 800 families would lose their livelihood and the company, and the Patel family, would lose face in their village. Secondly, the brothers had immense confidence in their superior manufacturing practices, commitment towards ethical business, and their vision of *honesty, truthfulness, sincerity and authenticity*, all of which they considered were their core strengths.

The Patel brothers' thinking was anchored strongly not only in how the business can survive the crises but also in how well they can take care of their employees. Dashrath reminisces that the brothers had thought back then that, if they were doing such a good job in processing diamonds and yet their contractors, such as Jasani Group, did not think about them, then they should do something else to stand on their own feet. Eventually the decision was made to stop doing job work for other companies and manage the entire manufacturing operations by themselves. This included procuring rough diamonds, processing them, and then selling them back in the market.

“Change is an obvious and inevitable thing in business. Those who adapt these changes would emerge as winner”, says Dashrath.

Capitalizing on core competencies

A new set of challenges awaited Samarth Diamond in the years to come, following their decision. How to procure rough diamonds in the open market? How to sell finished diamonds in a declining, competitive international market? What kind of business design and practices to adopt? What competencies to build on? These were only a few questions they had to ponder as they embarked

on the journey to change Samarth Diamond's entire business model, such as the lack of sources to procure rough diamonds from and markets to sell the finished diamonds in.

Samarth Diamond was a preferred trading partner for an important reason: quality. Out of everyone they used to work with, Samarth Diamond was always the best in terms of manufacturing the highest quality of diamonds. This led to Samarth Diamond becoming a renowned name in the market. It helped the company find suppliers to procure rough diamonds from.

After a while, to avoid the costs of importing and exporting small volumes of products every time, Samarth Diamond established a sister company called Craft Diamonds in Antwerp, Belgium. It is owned by Dashrath's son who today lives in Antwerp, Belgium, and looks after the company. Craft Diamonds procures multiple batches of good quality rough diamonds, puts all batches into one shipment, and sells them to Samarth Diamond. Besides Craft Diamonds, Samarth Diamond also purchases from other companies in Belgium and Hong Kong on a frequent basis.

Samarth Diamond also prides itself on its good name in the eyes of its buyers. The diamond industry, at least in India, was, and is, a partially organized sector. In most of the transactions, formal agreements are not made when one party purchases from or sells to the other party, and even if agreements are made, they are not strictly enforced. More than 80% of business transactions in the Indian diamond industry are based on informal commitments. When companies purchase either rough or finished diamonds from others, they would agree on a payment term orally. As such, trust plays a major role in business transactions. This could be a problem in certain cases as a company could take more time, pay in parts, or even fail to pay back at all, especially in situations like crises.

“Sometimes the wrong guy [company] creeps into the chain and causes problems, like not paying. Then a third party is often involved to resolve the problems,” Vipul Patel, the accounting department head at Samarth Diamond, says.

Since Samarth Diamond was, on the other hand, committed towards strongly sticking to the payment terms, they were considered a preferred business partner. Even during the current covid situation, Dashrath says, Samarth Diamond is one of the few who fulfils their payment terms on time. He says that anyone selling rough diamonds would prefer to sell to Samarth Diamond, even if at less prices, because of the guarantees of both quality and payment terms.

“When the worst period comes, everyone knows and trusts good people”, says Dashrath.

While Samarth Diamond found reliable sources of rough diamonds to procure from because of their fame, commitment, and honest business practices, they found, on the other hand, a niche market for their finished diamonds because of their skills and transparency. At the time, Samarth Diamond was manufacturing the top-quality stones in the very small size category. They were unparalleled in the cut, color, and clarity of small diamonds. They once again thought to leverage

this skill and expertise they had and decided to create a niche market to satisfy the needs of the customers that required high quality diamonds in small sizes. This was also a lucrative market because small stones go into highly priced jewelry and watches of luxury brands. The Patel brothers had set out to make their company one of the few that consistently manufactured highest quality diamonds in the global market.

Most of the companies usually deal in a wide range of products. As Vipul says in an interview, when a company manufactures gems of different cuts or types, sizes, and forms, they can sell whatever is in demand in the market. But the management team of Samarth Diamond thought that pursuing a similar strategy would make them just one of the many companies in the industry. They decided to be different; they wanted to be known for something specialized. Such a focused strategy was implemented and because of their skill and competitive advantage in manufacturing small sized diamonds, Samarth Diamond did not have a problem with finding customers in the international market where the demand for small sized diamonds was always good. Most of the stones are sold through Craft Diamonds because of its vicinity to the international market but customers may also directly trade from Samarth Diamond.

The brothers are also proud of the teamwork within the company, which has its origins in the family spirit itself. One brother used to manage manufacturing, the other administrative issues, and the eldest used to manage financial and managerial activities. The same level of teamwork and bonding can be seen across the company. Vipul gave an example that irrespective of the employee's hierarchical role, even if someone cleaning the company has an idea, her or his ideas will be listened to by the top management.

Vipul seems to have an immensely positive image about the competency that family firms in general, and Samarth Diamond in particular, have. He argues that in non-family-owned MNCs, everyone tries to safeguard their position and climb up. Family firms take care of both, the business and their employees. Vipul says that there are only a few companies in the diamond industry where the top management is open to ideas and employees take ownership. The company culture is determined by the culture of its founders. As the founders of Samarth Diamond were educated, and their educated children had also worked in other companies, gained experience, and then joined Samarth Diamond, the culture of the entire company is open and transparent, innovative and result oriented.

Overcoming all these challenges, by 2010, Samarth Diamond achieved a turnout of around INR 4.5 crore (approximately US\$624,000), with around 3,500 employees, and another 1,500 people to whom Samarth Diamond was providing job work. Exhibit 5 shows the transformation of Samarth Diamond's supply chain. Two major factors triggered this growth, transparency, efficiency, and openness: the company's attitude towards technology and employees.

Investing in technology

Technology played a vital role in Samarth Diamond's efforts to create a sustainable competitive advantage. When many companies were using manual labor to manufacture diamonds, when the market was uncertain due to financial crisis and companies all around the country were shutting down, and when obtaining financing was difficult and risky, the Patel brothers borrowed heavy loans and invested in modern machinery worth millions of dollars to streamline their manufacturing processes. People were trained extensively to run the machinery 24 hours in three shifts recovering the investment costs.

The main technological processes during diamond manufacturing are divided into the following. First, a planner machine helps to plan how a rough stone should be cut; a laser cutting machine then actually cuts the rough diamond into required shape and size; a polishing machine polishes the table, or the top surface, of the stone; a girdle making machine, also called a Russian machine, makes the diamond's girdle round; and finally a pavilion making equipment where the stone is put in a mold smoothens the pavilion, the bottom conic shape. Please see exhibit 6 for different parts of a diamond.

“I don't think anyone in the entire industry uses the technology we use in the small size diamond category. We could transform the technology that is used in manufacturing big diamonds, to manufacture small diamonds,” Vipul says.

Boni Patel, member of the top management at Samarth Diamond, recounts the story of how the company first used planning machines. When he had joined the company, all the decisions regarding planning were made manually. These decisions included whether to cut a rough diamond or not, whether to cut into two or three diamonds, what angles should be cut in, and what shapes in. In the high-quality grade, there are a variety of combinations they could cut each rough diamond in. They had to decide based on how much cost is associated with cutting a diamond in a specific combination and what would be the selling rate for that combination. The top management used to make calculations for each combination, write them all up on a piece of paper, and paste it in front of each worker. The worker would compare the expected yield of the diamond with the calculations in the paper and decide whether, and how, to cut a stone. But different workers had different levels of memory and capacity to understand the calculations which were, Boni says, so complex that even the top management was able to give only 70-80% of information in a piece of paper without it becoming too complex.

The planning machine made it easier to increase the efficiency in planning and shaping the diamonds. It streamlined the process and the optimum value generation increased from 28-30% to 35-36%. This increase meant that the company earned INR 1000 per carat at minimum. Kamlesh, the head of the manufacturing department, says that 70% of this additional profit is transferred to the workmen because their work increased as the output increased due to the introduction of

these machines. Kamlesh says, “*We saw that [factory] employees were not paid well in the industry. So, we offered them more, and the prime, skilled people came to [work for] us.*” Most of the remaining profit was used to invest further in technology.

Samarth Diamond was one of the first companies to implement the “single package system” renown in the diamond industry. Kamlesh remembers that the system was introduced in 2006-2007, one year after he joined the company, and, coincidentally, just before the financial crisis. Usually, when a rough diamond is purchased, it is evaluated and sorted based on the expected quality, i.e., clarity, color, and cut, of the polished diamonds it can deliver as well as the number and carat of stones they can cut from the rough diamond. When the rough diamond enters the manufacturing pipeline and is cut down into individual stones, usually packets of 10 stones go through the various steps of cutting, polishing, further enhancements, sorting, and other steps. As a result, if one stone needed repairing, the entire packet was stopped at that stage. In any case, a worker would work on only one stone at any given time. So, stopping all the 10 stones in each step of the process was unnecessary, according to Kamlesh.

When a company manufactures a large diamond, say more than a carat or two, the stone is so big that it is treated as a single package, i.e., the single stone is tracked throughout the process to evaluate how it is being treated and what quality does it end up of. This enables the company to keep track of their own manufacturing capabilities to determine how well they can convert rough input to high quality output. As each and every single stone is tracked and this information is used to evaluate the company’s manufacturing methods, this is known as “single package system”. Implementing this system in the manufacturing of small size diamonds is hard because it takes a lot of work in designing the technologies required for tracking and also a lot of work in generating and using the information because, where a few large stones are processed from a chunk of rough diamond, hundreds, if not thousands, of smaller stones are processed from the same amount of input.

“Implementing this system in small size diamonds definitely has more costs but the results outweigh the costs for us,” Vipul explains. “With this system, we can keep track of weight loss, breaking, and embellishments that affect how much of the input can we convert into high quality output..... Less than 1% of companies in our [small diamond] size use this system.”

Kamlesh adds, “the inventory [apparently] got low after using this system; individual stones now moved faster along the manufacturing chain and this decreased our inventory costs”.

This had also decreased the opportunity costs for the company because, when the market was good and the price was high, they could now sell more diamonds and at a faster rate. He remembers that when they implemented this system even when they were doing job work, there was some benefits. They could take more work from the companies as the output was realized sooner. Moreover, if a mistake was done in the manufacturing of any single stone, they could easily

track the employees who worked on it. So, the system clearly benefitted them when they moved to own manufacturing during the financial crisis that immediately followed.

Samarth Diamond has over time internalized many technologies into every leg of its business. Boni reflected that manual inventory management was hard because multiple people worked in different ways and some followed rules while others did not. So, they are currently developing IT systems in-house to completely automate the process of inventory management.

“We have already deployed some of the [control] systems during these covid times. As everything was under lockdown, and the regular business was a bit slow, we found some time to focus on this” Boni says.

He continues,

“we are also focusing on cost control. We must balance everything, from productivity to quality to inventory. We do not want to compromise on our quality to cut down costs. So, we must compensate by controlling something else, like increasing our productivity, so that we can control our costs. If we would tell people about our manufacturing costs, they won’t believe it was that high. But we bear these costs because we derive high value addition accordingly. Our costs are high because our employees’ salaries are high compared to other companies, around double or even more. Against this, we can balance costs only if we increase productivity and save the yield loss.”

Taking risky investment decisions is not a one-time thing for Samarth Diamond. Even now, during the covid-19 pandemic, they are following the same path. Boni comments that *“only when you take calculated risk, you can achieve competitive advantage”*. He reminisced that when they were doing job work, there was almost no use for planner machines in small size goods. Still, they had disposed of the old systems and invested in new machines. It was a risk because the investments were large but they had calculated that they could take advantage of those machineries. Similarly, last June 2020, they had procured 26 Galaxy machines that calculate and show the internal inclusions in the rough diamonds in 3D view so that the workers can see clearly what purity the stones are of. Boni adds that only manufacturers working with big sized diamonds use this technology but Samarth Diamond acquired them after calculating how much efficiency, quality and productivity could they achieve with them.

Investing in people

One of the core factors of Samarth Diamond’s success comes from its people. The Patel brothers are pride on their approach towards their employees: *“We never felt our employees as merely employees or labor. We thought they should develop too, in their personal lives as well,”* Dashrath says.

Vipul adds that if a company is committed towards its employees, it will sell its products cost-to-cost or even at a loss so that it can pay its employees.

“We have invested a lot in technology. Besides technology, we have also invested a lot in people”, Dashrath says.

ABN AMRO (2017), borrowing from various sources, states that the average living wage in India is US\$182 per month which converts into approximately INR 14,000 per month and which is the average wage also paid in most of the diamond manufacturing companies in India. While for Samarth Diamond this is the minimum wage standard which easily goes up to around INR 20,000 and more valuing the individual performance of skilled and committed workers. During the current covid-19 situation, Samarth Diamond did not fire anyone. Factory and lower level employees were paid in full without any wage reduction and, where the rotation system was used, they were paid based on their working hours. For those working at the managerial and the top management levels, with fixed salaries above INR 25,000, 10-30% of salary was cut during the lockdown. When asked about their reaction, Dashrath says that, in times when other companies are not paying and are even closing down, it makes sense to collectively help the company overcome downturns. He asks, if the company would not survive, how could it pay anyone? This was a common idea shared across the employees. According to the Patel brothers, some people have come forward offering not to be paid for a month or two. This was something that had also happened during the financial crisis. Several employees, both at the factory work and managerial levels, had volunteered to take a pay cut to help the company come out of the troubled times. Some had even worked for free for months together to help the company.

“You need good people to achieve competitive advantage in the market,” Kamlesh says.

The company had also tried to keep its employees safe while continuing everyday operations during the covid-19 crisis. Boni comments that they had realized that covid-19 was not a short-term problem. On the other hand, they also had to restart work. Every employee was obviously tested. In addition, Boni explains what the company had done to manage the infection risk:

“We trained even the more uneducated factory floor workers how to use Skype. They were given extensive training over Skype regarding how they should work once we reopen the company. We declared fines or penalty for people who would not follow the rules. They were taught the importance of following the rules and how they should work. Once we reopened, we have indeed seen the effect of this [training]. We got four positive cases but all of them were in different units, not in the same unit, and no one around them got infected. So, our efforts paid off. We even took those four people to the hospital. We had also put the [other] people [working in the unit] around them in quarantine for 14 days according to the government regulations.”

Today, Samarth Diamond uses a performance-based remuneration system for almost all of its factory workers. They say that this motivates the employees to contribute to the value addition process at each stage of manufacturing. This is prominent in the company's polishing department where workmen polish the 58 facets of the diamond. There are around 28 groups, or units as the company calls them, with 70-80 workmen in each group. They include different people specialized in polishing different facets of the diamond. Each unit polishes and produces around 600 stones per day. One of the major issues in the polishing department is minimizing weight loss, i.e., the volume of the stone that is lost during polishing. Boni says that, initially, when they told any worker to keep an eye on weight loss, it was not very effective because they were not motivated. They used to think that it did not matter very much if they performed slightly better or worse. Then the company connected the workers' salaries to the weight loss. Data regarding which worker polished which stone and how much weight was lost was all stored in the computer system. So, it was possible for the company's management to compare and talk to the supervisors of different units if differences in weight losses occurred. The salaries of the workers are also adjusted based on this performance and so, Boni believes, people actually care about weight loss now. The workers cannot even question the fluctuations in their salary because with the standardized performance monitoring, the management can easily show them how their performance fluctuated. These differences in salaries are considerable, for example, one person would get INR 24,000-25,000 (US\$324-340) while the other would get INR 34,000-35,000 (US\$460-480) per month. Controlling this weight loss is also important for the company. Saving even a 1% weight loss would affect the company's profits. The company polishes around 300 carats of diamonds per day on an average. 1% weight loss converts into a saving of INR 3,750 per carat, i.e., INR 11,25,000 (US\$15,220) for 300 carats of diamonds per day.

Samarth Diamond implements a strict yet transparent method of evaluation of employees. Employees can compare their own work output with other employees. This evaluation is mainly objective and supported by computerized systems; while there was 80% subjective management-based assessment and 20% automated one associated with diamond cutting and polishing before, it is 20% subjective and 80% automated today. The entire diamond manufacturing system became totally computerized and, depending on the rough diamond characteristics, the system will give an estimate of the range of finished products that can be made. Samarth Diamond evaluates an employee's performance based on how much they managed to achieve against the computer's parameters. Moreover, employees are evaluated based on a range of outputs rather than just one.

Vipul comments that the employees receive a lot of training, not only related to work, but to personal life as well, like budgeting, meditation, being happy and developing relationships, at least once or twice a month, which contributes to their overall personal development and well-being. These trainings are conducted usually on weekends so that regular work is not disturbed. Some of these trainings are mandatory for the employees, like team building events for managerial staff, while others are optional, like spiritual or yoga events. The sessions conducted for factory

workers, including those on how to better manage financials and how to achieve work life balance, are carried out for a few departments or units at a time as it would be hard to conduct a session with thousands of attendees. Of course, these are conducted during working hours and are rather shorter in duration.

Vipul believes that *“a chain is only as strong as its weakest link”* and these trainings and social benefits foster employees’ self-reflection to become better and grow. The company offers many growth options to their employees. Someone who had joined at a lower level position can today be seen in a managerial level. While there are some standard operating procedures to be followed, employees do take ownership of the processes and implement them. Samarth Diamond also takes a balanced approach towards decision making; between centralized and decentralized decision making. While the majority of decisions are taken by the top management in most family owned firms, at least in the Indian diamond industry, at Samarth Diamond, managers are flexible to implement their decisions at their discretion. The only factor that the top management considers is the balance between the costs to the decision and the results. If a manager wants to experiment with some operational processes or managerial practices, they can do so under a certain budget. If the cost runs over the budget, then the discussion becomes about what lesson did the manager, and the company, learn from this experiment. Of course, strategic decisions like major investments in technology or other assets, expansion and business growth. are taken at the top management level. However, managers are given a free hand to run their department operations. Samarth Diamond also takes care of its employees with the same utmost attention that it pays to evaluating their performance. For this reason one of the main focuses of Samarth Diamond since its inception was to provide social security benefits to all its employees and treat them the same way the founders and their family members would be treated. This belief and commitment come across in the company’s practices and policies concerning its employees. For instance, despite being in an unorganized sector where company-provided benefits are almost non-existent, Samarth Diamond provides all the social security benefits to its employees, including pension funds, insurance, bonuses and gratuity. Boni says that, amongst small and medium sized Indian family firms especially producing small diamonds, almost no one provides these benefits. He emphasizes that no employee was demanding these benefits, and in fact they did not even know about them, but the top management decided to provide these benefits because they wanted their employees to have some savings when they retire or leave the company. Boni goes on to say that a lot of companies do not do this because they operate on a very thin profit margin, of 1-2%. Moreover, the diamond manufacturing industry is very large and there are many companies and many more people to work in them with little bargaining power. The majority of companies in the diamond industry treat their employees as waged labor and, as a result, see a lot of turnover. Kamlesh says that the work in the diamond industry is not entirely manual or machine based. He argues:

“We need good people to work on these machines. To get good people, [we recognize that] they want the same benefits and things that we want too. If we want sustainable life, they want that

too. If we want health benefits, they want them too. So, we just try to give them that. We have all our employees on roll. We even won an award in 2015-16 for being the company with the highest [number of employees] on roll in the diamond sector in the entire country.”

Samarth Diamond is the only company in the industry where, if an employee dies, the company and its staff collectively assist by donating one day salary to the deceased's family. Their children are helped to acquire education and the spouses are offered jobs in the company if feasible. Moreover, women working in the diamond industry is very rare. But at Samarth Diamond, around 500 women work in the factories thus breaking this barrier as well. As both Dashrath and Vipul said, people trust that women will be safe at Samarth Diamond which is an important criterion for Indian families. The company is the largest employer in Visnagar and contributes to the community through INR 4-5 crore (US\$ 552,465,000-658,880,000) in salaries alone per year. There are around 4000 employees working in the manufacturing facilities, around 120 managers supervising these workmen, another 20-25 middle level management that oversee different units, and around 20 top management.

Besides investing in its own employees and their families, Samarth Diamond also engages in traditional philanthropic work too. They often conduct events like blood donation camps and contribute to local charities. They have adopted a school and work with a mentor who also works with the Delhi government. They charge nominal fees for students. The company bears all the salaries and other expenses of the school.

Chapter 4

Conclusions

This teaching case first explained the value chain and its major players in the global diamond industry and the value addition along the value chain stages. Starting from how rough diamonds are mined to how they are cut and polished in the Indian diamond industry, it gave a brief introduction to the industry as a whole. Then the teaching case showed how Samarth Diamond, an Indian family-owned firm, has survived the financial crisis to emerge as one of the leading companies in the industry while other companies were closing shop. They have achieved this by taking risks and investing in technology and people as they have long recognized that these two assets are the crucial elements for any business to succeed.

Family firms are generally risk averse and are prone to sticking to the status quo as much as possible, especially if the change requires hefty investments. Technology has long been shown to help organizations achieve change or transformation efficiently. Yet, adopting new technologies is a huge undertaking involving risks. Samarth Diamond has recognized that technology can give them an edge in the market. Even with steep learning curves, they have adopted every modern technology available to them and also invested in enabling people learn and use it. With addition of each new machine, they kept adapting their manufacturing processes. Even when technology that perfectly fit their requirement was not available, they developed systems in-house to achieve their goals such as automating the performance evaluation of their employees. They calculated the benefits and used systems that large multinationals would use. It would not be an overstatement to say that these risky investments in technology has enabled Samarth Diamond to be one of the leading companies within its industry, in terms of both manufacturing capabilities and process innovation.

Family firms are known to have a focus on non-financial goals as well, such as social and community development. But most of the care accrues to the immediate family that owns the firms. Samarth Diamond is different. They consider all their workforce, may it be managers or factory floor workers, as their extended family. The employees, even those on daily wage, earn more than the industry average, have access to insurance and health benefits, are provided facilities like transportation and subsidized meals. Furthermore, the company also contributes to local community development through philanthropic activities. Because of better living conditions of Samarth Diamond's employees, the local economy also thrives as the employees' increased disposable income will benefit local businesses. Their every decision, from technology adoption to international expansion, from trade in the market to the development of processes and procedures, was anchored in one core aspect: to integrate the needs of their stakeholders, and importantly their employees, into their corporate decisions. All these reasons motivate Samarth Diamond's employees to work harder, smarter, and with more passion. They take ownership of their work and act responsibly. The company also attracts talented employees because of the benefits they provide. An open culture of knowledge and ideas sharing, combined with a transparent and flat hierarchy, offers any employee to define her or his own goals and climb to a better position in the company.

Exhibit 1. Diamond industry value chain

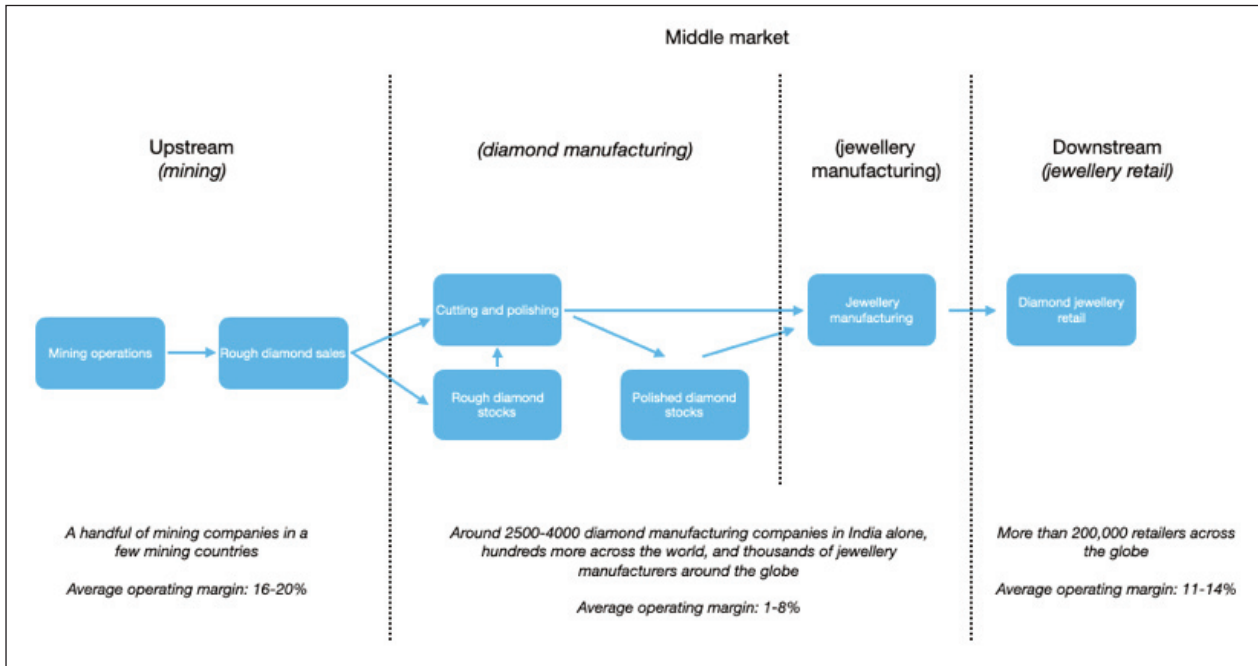
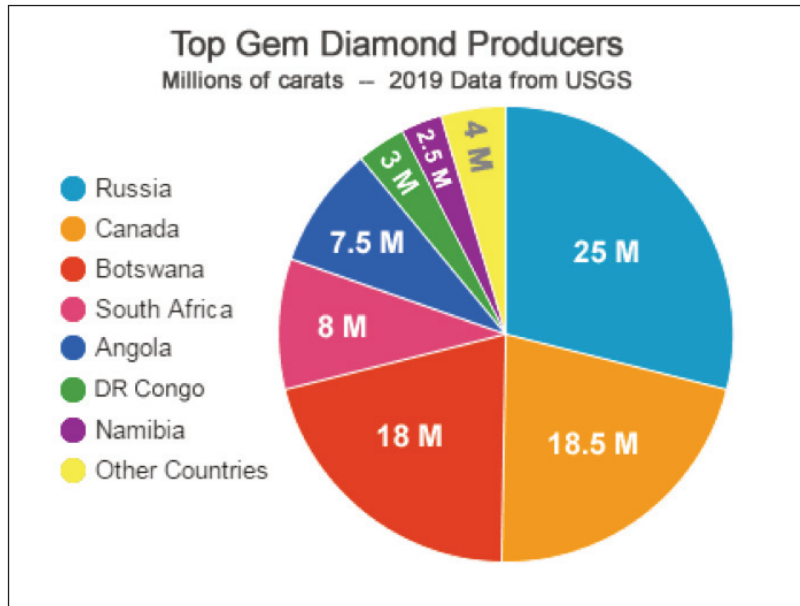


Exhibit 2. A map of major mining countries



Source: <https://geology.com/articles/gem-diamond-map/>

Exhibit 3. Distribution of countries by weight of diamond mining



Source: <https://geology.com/articles/gem-diamond-map/>

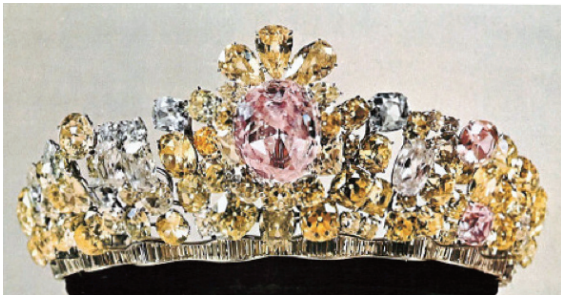
Exhibit 4. Darya-e Nur, Nur-Ul-Ain, Kohinoor, Hope and Regent diamonds



Daria-e-Nur (Sea of Light) diamond from the collection of the national jewels of Iran at Central Bank of Islamic Republic of Iran.

Picture taken under the Creative Commons Attribution-Share Alike 4.0 International license from Wikimedia Commons. Attribution link:

[https://commons.wikimedia.org/wiki/File:The_Daria-e_Noor_\(Sea_of_Light\)_Diamond_from_the_collection_of_the_national_jewels_of_Iran_at_Central_Bank_of_Islamic_Republic_of_Iran.jpg](https://commons.wikimedia.org/wiki/File:The_Daria-e_Noor_(Sea_of_Light)_Diamond_from_the_collection_of_the_national_jewels_of_Iran_at_Central_Bank_of_Islamic_Republic_of_Iran.jpg). Picture can be shared or used under the same distribution.



Nur-Ul-Ain diamond in the Tiara of Empress Farah Pahlavi scanned from the original Iranian Postcard printed in 1967. Similar license description as above at

https://commons.wikimedia.org/wiki/File:Noor-ol-Ain_tiara.png.



The 105 carat Kohinoor diamond in one of the royal crowns in the Tower of London. Picture taken from erewise website at

https://www.erewise.com/current-affairs/history-of-the-legendary-koh-i-noor-diamond_art5715fa128aa67.html. The history of the diamond can also be found at this link.



The 45.52 carat Hope diamond at the Smithsonian National Museum of Natural History. Picture taken from their official website at

<https://geogallery.si.edu/10002684/hope-diamond>.

The history of the diamond can also be found on their website at

<https://naturalhistory2.si.edu/mineralsciences/hope/timeline.htm>.



The 140.64 carat Regent diamond cut from a 426 carat rough diamond at Louvre museum. Picture taken from their official website at

<https://www.louvre.fr/en/oeuvre-notices/diamond-known-regent>

where more details about the diamond can also be found.

Exhibit 5. Strategic change of Samarth Diamond's supply chain

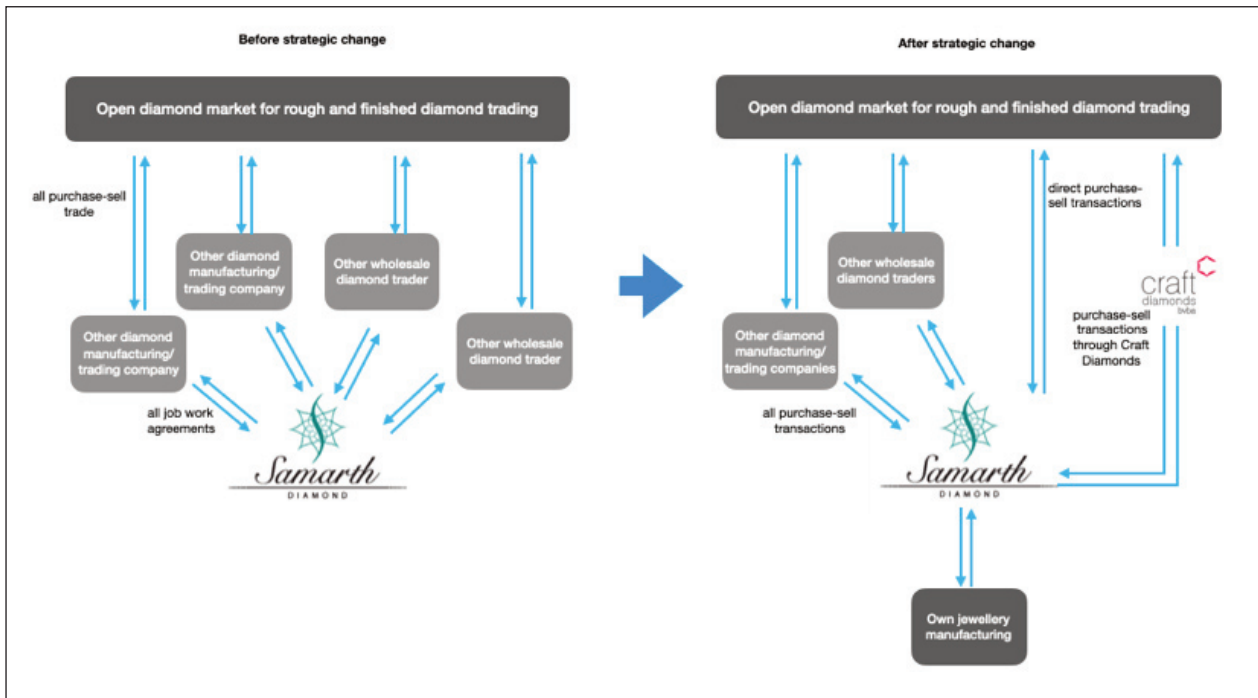
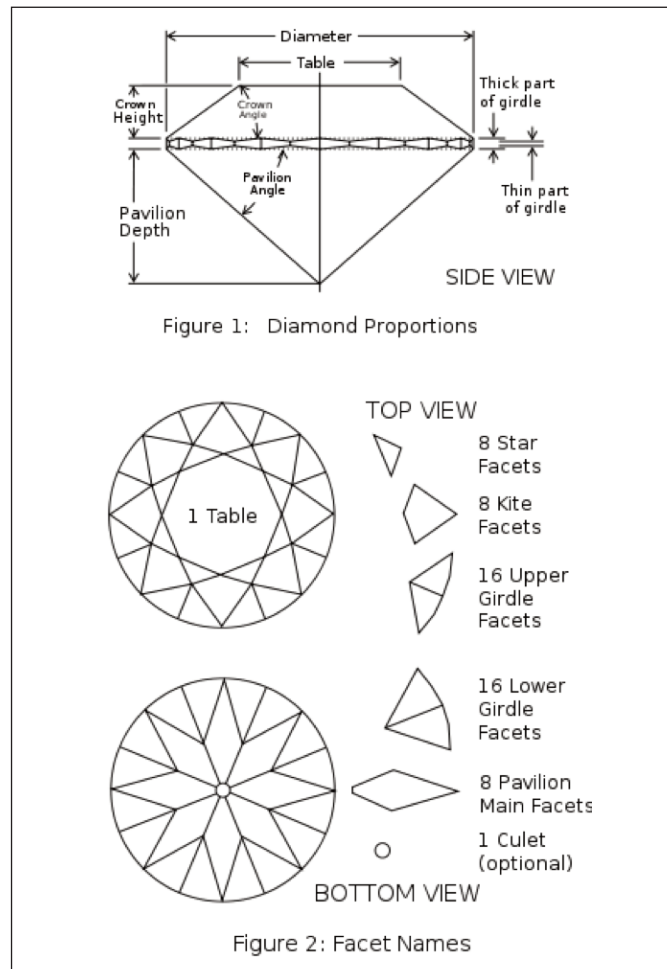


Exhibit 6. Different facets of a round cut diamond



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