Chapter 1

INTRODUCTION OF DIAMOND INDUSTRY
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CHAPTER – 1

Introduction of Diamond Industry

1.1 INTRODUCTION OF DIAMOND INDUSTRY:

Diamond brightness is increase like gold's yellowness and silver's whiteness but diamond gives brightness after processing of diamond and India has a world largest diamond processing industry. The total workers of diamond industry in the world are 95% workers are Indian and in these workers 90% workers are from Gujarat specially Saurashtra Region.

Today diamond Industry is very well developed. The diamond industry growth pattern in world in last four decade is continues increase and employment requirement day by day touch the level high. It shows very much important of the diamond industry.

Yet, the workers who cut and polished precious stones after receive poor wages with poor job satisfaction trends, lacks of people work full-time in the industry, but most of working place poorly lit and workers facing no. of problems.

The Industry has three main stages —

(i) Mining
(ii) Cutting and polishing of raw or "rough" diamonds and
(iii) Trading and retailing.

These process can happen within countries some diamonds are collect from mined and processed in the same country or as in the case of most diamond, mined in one country and cut and polished in a second country.
While there are 19 countries where diamonds are mined, the major producers are Australia, Zaire, Botswana, Russia, South Africa, Angola, and Namibia and a number of lesser producers such as Sierra Leone and Zimbabwe. As competition intensifies in the diamond industry, the major diamond mining companies are actively seeking to mine depositors in places such as Canada and in the north of Nordic countries.  

The ‘big four‘ diamond cutting centers are Antwerp (Belgium), New York (US), Ramat Gan (Israel) and Mumbai (India), but there are additional smaller centers in Thailand, Sri Lanka, China and Russia. The big four cutting centers

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are also the main diamond trading stations with the addition of Hong Kong, which services buyers in Asia.

The majority of the world’s diamonds are traded through the central selling Organization (CSO), the marketing arm of De Beer’s – A single company controls a significant proportion of the trade in diamonds. They are based in Johannesburg, South Africa and London, England. The production and distribution of diamonds is largely consolidated in the hands of a few key players and concentrated in traditional diamond trading centers.  

The De Beer’s company, as the world largest diamond miner holds a clearly dominant position in the industry, and has done so since after its founding in 1888 by the British Imperia list Cecil Rhodes. De Beer’s owns or controls a significant portion of the world’s rough diamond production facilities (Mines) and distribution channels for quality diamonds. The company and its subsidiaries own mines that produce some 40% of annual world diamond production. At one time, it was thought over 80% of the world’s rough diamonds passed through the Diamond Trading Company (DTC) a subsidiary of De Beer’s based in London) but presently the figures is estimated at less-than 50%.

Further down the supply chain, member of the World Federation of Diamond Bourses (WFDB) act as a medium for wholesale diamond exchange, trading both polished and rough diamonds. In 2000 the WFDB and International Diamond Manufacturers Association (IDMA) established the World Diamond Council to prevent the trading of diamonds used to fund war and inhumane acts. WFDB’S additional activities also include sponsoring the world Diamond Congress every two years, as well as the establishment of the International Diamond Council (IDC) to oversee diamond grading. 

A large trade in gem-grade diamonds exists unlike precious metals such as gold or platinum, gem diamond do not trade as a commodity: There is a substantial mark-up in the sale of diamonds and there is not a very active market for resale of diamonds. One hallmark Mark of the trade in gem-quality diamonds is its remarkable concentration. Whole sale trade and diamond
cutting is limited to a few locations 95% of diamond pieces cut in Surat, Gujarat, India.  

The diamond industry is one of the major industries of India. Its contribution is significant in the economy from employment and exports point of view. The Gujarat state and Surat city in particular has contributed a great deal in the development of diamond industry. The growth of diamond industry has helped the economy of India, Gujarat.

About 15 lacks workers are employed in this industry. These figures speak about itself importance from employment point of view. The diamond industry of Gujarat is mainly unorganized. The diamond industry in Surat is about 50 years old by now. But in the last few years its growth has been very impressive. Most of its workers and entrepreneurs are from Saurastra region of the Gujarat State. Such migration has taken place because of lot of economic opportunities in this industry.

Number of employees working in this industry so industry have been much importance towards workpoint of view but Industry have faces many problems like lack of capital, unexperienced and untrained workers are basic constrains of the diamond industry, but it provides more employment on per capita investment. The working hours of diamond processing centers are flexible and very from one unit to another. The wages paid to the workers in the diamond industry is found more lucrative compare too many other industries.(Firm)

Normally job-satisfaction leads to higher performance of productivity. The most realistic approach under system concept is that both job satisfaction and problems are correlated and influence each other, these two have circular relationship. Thus, job satisfaction leads to productivity if effective working condition is provided.

The researcher proposes to investigate a study of workers problem vis-à-vis job satisfaction trends in diamond industry of Gujarat state. This study gives details concerning social and economical characteristics as well as Job-satisfaction trends of the workers getting employment with high level of job-satisfaction in diamond industry of Gujarat State.
1.2 Meaning & origin of Diamond:

There is little confusion surrounding the origin of the word “DIAMOND” in tracing the word history. The word itself “Diamond” comes from the old French, “Diamante”. But diamond is derived from ancient Greek “Adamas”, which means “unconquerable”. However, Adams was the word for iron or ironic alloy, as far back as 800 B.C. apparently lacking a word to apply to other substance as hard, as or harder than iron, Adams was used to apply to what probably was the diamond.  

1.3 Nature of Diamond:

DIAMOND – A word which a wakens beauty, mystery and romance, a gem revered for centuries and credited as both poison and Miracle drug is a natural Paradox. It is at once the hardest substance known to man, yet it will shatter into bits and pieces if struck at the proper point. 

Natural diamonds are unique because of their specific characteristics chemically it is carbon. According to one scale of Measurement 140 times harder than the sapphire and will cut corundum which itself is used as cutting medium.

When measuring diamonds, the term carat is used. This is measure of weight and it is a determining factor in assessing value. One metric is ½ , 268 of a pound, or 1/142 of an ounce, or 1/5 of a gram. Of the originally mined carets, less than one forth (1/4) can be classified for sale as gems.

Diamonds is thought to melt ground 3700 degrees centigrade. But it will change color at much lower degrees of heat. Heat treatment at 500-900 degrees centigrade for several hours turn most green irradiated diamonds to yellow or cinnamon brown, which is often considered a more attractive color of a diamond artificially, this fact must be transmitted during any sale agreement.

Yet diamond is one special form of carbon, one of the most common of all materials, occurring as it does on and in the earth's crust in millions and millions of tons, carbon is a major constituent of all trees and plants and their residues, such as coal, It is the basis of petroleum and is widely distributed in
combination in many rocks such as limestone, carbonates and so on carbon as such, free from combination with other atoms, can exist in three distinct varieties. The one is non crystalline i.e. amorphous carbon, such as wood charcoal; The other two varieties are crystalline. These are graphite and diamond, Graphite is fairly common, soft, and friable and solid; it is the black-lead of our pencil, at times called plumbago. Diamond is rare, immensely hard, clear and shiny. 12

1.4 Diamond Production:

Diamond Production of Primary deposit (kimberlites and lamproites) only started in the Diamond fields in South Africa, Production has increased over time and now and accumulated total of .5 billion carats have been mined since that date. 13 Interestingly 20% of that amount has been mined in the last 5 years alone and during the last 10 years a new mines have started production while 4 more are waiting to be opened soon. Most of these mines are located in Canada, Zimbabwe, Angola and one in Russia.

In 2005 Russia produced almost one-fifth of the global diamond output, Diamond prospectors continue to search the globe for diamond bearing kimberlite and lamproite mine.

1.5 Diamond & India – Historical Significance:

The name diamond derived from the ancient Greek a damask (“invincible “). They have been treasured as gemstones since their use as religious icons in ancient Indian and usage in engraving tools also dates to early human history.

Diamonds are thought to have been first recognized and mine in India (Golconda being one of them), where significant alluvial deposits of the stone could then be found along the rivers penner, Krishna and Godavari Diamonds have been known of India for at least 3000 years but must likely 6000 years. 14 From ancient times, India is very well known in the world as the “birth place “ for diamonds. It has remained the home of diamonds for over two millennium. It is difficult to trace the origin of Diamond but the history says
that in the remote past, Diamonds were mined only in India. Diamond production in India can be traced back to almost 8th century B.C. India in fact, remained undisputed leader till 18th century when Brazilian fields were discovered in 1725 followed by emergence of south Africa, Russia and Australia. World famous diamonds such as koh-I-noor, the orloff, the Great Mogul, Sancy Hope. Florentine, Nassak, Regent, Pitli, Nizam etc. Where the products of India and many of these world famous diamonds were recovered from India in 16th & 17th centuries.

In ancient time, India understood the importance of Diamond where as other countries understood the importance of Diamond where as other countries understood about 200 to 250 years. In the ancient time, many legends were famous about diamond, Suppose there legends were legends were true or not but in this time the importance of diamonds proved by these legends.

In this time in India there are markets of the diamond jewellery are very well. So, these types of legends were not famous. Before sixth century Buddha Bhatt wrote the book of “ Ratna Pariksha “ on in the sixth century varah mihir wrote ‘ Bruhad Samhita ‘. In both books proved the diamond as best jewellery. Before wrote those two books Kautilya wrote economics before 800 to 900 years. In these books in fourth centaury B.C. it means before 2400 years we understood the true value of diamonds, in this time diamonds are the medium of barter system there are octorozon and tax on the diamond and those incomes was the important part of the state’s income.

In the ancient time the color of diamonds are definite of the cast. In India Brahmin can be wire white diamonds. Businessmen and Land lords or Farmers can be wore yellow colored diamond. Xxtriyas and Soldiers can be wore red colored diamonds. Shudras and Laborers and workers can be ware black brownish colored diamond like iron, in other culture the color of diamond definite the cast and Varna. 15
1.5.1 Biblical Reference:

Diamond is a strange and wonderful material. For over 5000 years the small pieces of rock called diamonds have excited the wonder, interest and envy of man, from the richest prince downwards. Diamonds are unique little crystals, and being the hardest material known to man they are also of considerable significance both to the modern scientist and the modern technologist.

Diamond has aroused intense interest in the historian and the folklorist, the industrialist and the man of wealth, the scientist and the technologist, the speculator and investor, the craftsman and the aesthete. Many diamonds are linked to a strange history, often a history of theft and murder and it is certainly the costliest of all natural minerals (if we leave out those modern curiosities, the radioactive concentrates, which chemists extract with such cost and labour.

Yet diamond is but one special form of carbon, one of the most common of all materials. Occurring as it does on and in the earth’s crust in millions and millions of tons, carbon is a major constituent of all trees and plants and their residues, such as coal. It is the basis of petroleum, and is widely distributed in combination in many rocks such as limestone, carbonates, and so on. Carbon as such, free from combination with other atoms, can exist in three distinct varieties. The one is non-crystalline, i.e. amorphous carbon, such as wood charcoal; the other two varieties are crystalline. These are graphite and diamond. Graphite is fairly common, soft, and friable and solid; it is the ‘ black-lead ‘ of our pencils, at times called plumbago. Diamond is rare, immensely hard, clear and shiny.¹⁶

1.5.2 Ancient Virtues Attributed to Diamond:

In the early Middle Ages the diamond was a rare, highly valued object, which was worn not as a decoration or as an object of beauty, but as a magical amulet. Indeed, since only natural unpolished stones were at first available and as these only occasionally have an attractive shape (and this only as a rule when they are small), it was not the appearance but other properties which
gave the diamond its special position. As a decorative gem it was not at first rated as highly as the ruby or the pearl. Its real magical importance was due to its great hardness. Because of this hardness, by the simple and familiar process of sympathetic magic, it was firmly believed that diamond could endow its wearer with corresponding hardihood and manhood. It was thus worn exclusively as an amulet and only by men, for clearly the quality of hardihood and manliness is hardly likely to appeal to women. Diamonds were, therefore, often worn in a sword-hilt on a helmet, on a dagger. Many a valuable gem must have been lost on the battlefield, and equally, many a gem was found as spoils when the fallen were stripped after a battle.  

In the National portrait Gallery in London is portraits of Henry IV painted about A.D. 1400 and on the monarch’s sleeves are two enormous octahedral bluish stones, recognizably natural diamonds. They are, perhaps, the best put of an inch across. One might guess that each stone would be of formidable weight, but of course the artist might have exaggerated the size deliberately, since no other decoration is worn on the sleeve.

The diamond was believed to have many miraculous powers.

The magical virtues attributed to diamond were very well summarized by Leonard’s in 1502, who asserted that it has the following properties. He says it repels poisons, it disperses fears and it is a formidable defense against sorcery. When worn it quells quarrels. It is a reliable cure for lunacy and a certain remedy against possession by devils. If worn on the left arm, it leads to the conquering of enemies and enables one to tame wild beasts. It is also a cure for nightmares. Above all, it makes its wearer courageous and bold in battle with all these won direful supposed virtues, it is no surprise that the diamond was of so great a value that only kings and princes could afford to possess it. Diamond was the, king of magical stones, fit for kings.
1.6 Solidity of Diamond:

The two particularly outstanding physical properties of the diamond are:

(1) **The hardness:** Diamond is easily the hardest material in nature. It is also a good deal harder than the synthetic carbides developed within recent years which are considered to be next to diamond in hardness.

(2) **Its optical characteristics:** Diamond has very special optical properties which are responsible for the brilliant admantine luster and fire which makes the well cut diamond gem such an object of beauty and attractions. It takes on a high polish both because of its hardness and its high reflectivity. When light enters at an angle off the perpendicular in to any transparent liquid or solid, the path taken by the light deviates, i.e. the light is reflected. The amount by which the light is deviated is called the refractivity. The refractivity of diamond is extremely high. Indeed, Refractivity is measured in terms of a number, the refractive index, which depends a little on the colour of the light. \(20\)

Although most people vaguely understand what is meant by hardness, this is a difficult scientific concept to recognize quite a variety of different kinds of hardness. There is for instance, amongst these, a unique hardness, i.e. how does a material stand up to rubbing?

Then there is indentation hardness, which is a measure of how a material resists penetration by another and harder body. A further useful measure, technologically is re-bound hardness and, another long-used and useful property is scratch hardness. For perhaps 150 years (and even now) scientists, engineers and mineralogist made use of a hardness scale introduced by the mineralogist. **Mohs,** It is arranged ten minerals in a series such that any mineral could be scratched by any one above it. The softest, talc was graded 1, and next came gypsum, graded 2 and so on. Towards the top of this scale topaz was placed at 8, **corundum** at 9, and finally, at the very top, diamond at 10. Now in fact the real difference in hardness between diamond (10) and corundum (9) is very much bigger than the real difference between corundum (9)corundum and topaz (8) The scale is not a proportional one, but is useful for defining the properties of minerals.
Other more accurate scales have since been developed and one which is widely used is the Vickers hardness Number, a number arrived at from measurement of the amount of penetration suffered when a body is subject to pressure by a sharp diamond point of given shape, and using a given applied load. To give some idea of Vickers numbers, the hardness number of typical brass is 100 that of a good steel some 500. Topaz (8 on our mobs scale above) has a Vickers hardness of 2,000. The modern, technical, very hard abrasives, boron carbide, tantalum nitride and silicon carbide, have respectively, hardness 2800, 3200, and 3500 on the Vickers scale.

1.7 Shapes of Diamonds:

Both diamond and graphite consist of a crystallized group of carbon atoms. In diamond the carbon atoms are locked into a very tight, regular pattern, whereas in graphite the pattern is looser and less symmetrical. The close packing of the carbon atoms in diamond makes it a relatively dense and heavy mineral. It is because the atoms in the crystal are so tightly packed that the diamond is so hard, for they cannot easily be pushed closer together. The density (ratio of weight to that of an equal volume of water) is 3.52. This is high if it be recalled that the densities of granite and marble are only 2.5 and those of quartz and sand just 2.6. The density of graphite is 2.3. This high density of diamonds is exploited in the modern extraction techniques for mining diamond.

The diamond crystal can be found in a variety of related shapes. Most noteworthy in appearance is the octahedron. The octahedron usually has fairly plane faces, but very frequently these have on them numerous tiny, regular, triangular pits which are called trigons.

Variations of the octahedral from present interesting types, at the times crystal develops as earlier a thin triangular plate or else, quite frequently, and it adopts the triangular shape known in the diamond trade as a macle. This is what the crystallographer calls a twin, for the two halves, upper and lower, are in the nature of image of one another. A macle can introduce formidable difficulties in connection with polishing. A notable rare type of macle has a crossed star shape.
Also a rare diamond workers striking crystal shape is what is traditionally known as a portrait stone. This appears as a beautifully formed transparent fairly thin yet reasonably large flat hexagonal plate. Such crystals, when found, have been used as windows over small miniature portraits pointed on ivory, worn either as a brooch or on a ring, hence the name portrait stones.

Although pure diamond is one of the simplest of materials chemically (i.e. it is pure carbon), very frequently a small amount of iron oxide impurity is included and it is this which is largely responsible for giving so many diamonds a yellowish tinge. The value of a diamond is determined by its size, colour, shape and flawless is said to be of the first water, then the colour appellation is attached, if any, thus, a first water pink gem. The rest are classified in diminishing value, largely according to colour several classifications have at times been adopted commercially. Typical is the following kind of grading:

1. Blue-white
2. White
3. Light cape
4. Dark cape
5. Light brown
6. Dark brown

And of course, expert dealers subdivide these grouping. Special optical instruments called tint meters have been devised for the express purpose of grading diamonds by their colours to assist pricing and buying.

Of the delicately coloured transparencies, which can fetch very high prices there occur, occasionally, canary-yellows, greens and browns. Beautiful pinks have very rarely turned up and ruby red is at times found. But perhaps the rarest of all is a sapphire blue colour which can command a peak price.

Completely black diamond, carbons, or carbonado, seem to be a mixture of diamond and opaque graphite and are useless as gemstones but retain considerable technological value.
Many diamonds are found which appear matt, dirty and opaque, but this in some cases only due to a thin skin-covering of impurity and if this be polished off a good transparent crystal can be found intact below it. Not infrequently a diamond contains an inclusion around which in has grown. This may be another mineral, but in rare instances it is another, separate diamond which is occluded by a double, act of growth, such freaks are of considerable scientific interest.

1.8 The carat, Measurement of Diamond:

For many centuries the adopted working carat was a different part of Europe, but always more or less then same, i.e. something near to a fifth part of a gram, or 1/140\(^\text{th}\) part an ounce, strangely enough, although the carat has been in use in this country since Norman times at least, it was for long only an agreed Measure of commerce and had no read legal standing at all. Even up to the middle of the nineteenth century the persistent differences in different trading centres were still appreciable. The weight in milligrams of the carat was 197 in Florence, 205 in Berlin, 206 in Vienna, 207 in Madras. The value used actually ranged from 188 to 213 milligrams a variation of some thirteen percent. This was too much to be tolerated for reliable international trading and after much discussion, finally in 1907, the International Committee on weight and Measures in Paris proposed the adoption of what is now called the metric carat, which was to be exactly 200 milligrams, i.e. 1/5\(^\text{th}\) of a gram or 1/142\(^\text{nd}\) of an ounce. The Frence Government sought international agreement but this very sensible proposal was resisted by many Jewellers. However Pressure was exerted and in 1915 the Board of Trade in this country at last legalized the metric carat. This was carried out more or less simultaneously in Britain, Holland, Belgium and the U.S.A. the four countries in which the dealing in diamonds was mainly concentrated strangely enough, south Africa, a principle source of diamonds only adopted the metric carat as late as 1923.

It is now universally used for gemstones and this fact must be remembered when the weights of old historical diamonds are being discussed.
It is not easy to visualize carat sizes, but the following will help. A natural octahedron of height about $\frac{1}{10}$th of an inch could weight $\frac{1}{10}$th of a carat. An octahedron of height one quartered inch could weight about 1 carat. For an octahedron of height half an inch, the weight might be 8 carat. The polished gem of the shape called the brilliant grades differently because of the material lost in shaping. A brilliant $\frac{1}{10}$th of an inch across weights about $\frac{1}{16}$th of a carat, while a 1 carat Brilliancut gem has a diameter of about one quarter of an inch. A brilliant gem of diameters half an inch would weight about 8 carats. It will be seen that a 1 carat gem is a sizeable stone, hence the need for the division into points when estimating prices, especially of the finished products, since a good quality, carat, finished, brilliant shaped diamond can cost currently some $1600$ in the U.S.A. that very small additional quantity of weight which is called the print, although no more than a mere 10 milligrams, i.e., just about $\frac{1}{14000}$th part of an ounce, is worth as much as $16$. It is not surprising that finished brilliants are very carefully weighted to $\frac{1}{100}$ the parat of a carat nowadays by jewelers when valuation takes place.  

1.9 Properties of Diamond:

There are two types of properties of Diamond:

1.9.1 Physical Properties of Diamond

Diamond has a number of other interesting physical properties which characterize it? Being pure carbon it can be burnt in oxygen to form carbon dioxide, the gas which puts the sparkle in lemonade! Even as early as 1664, Robert Boyar had discovered that a diamond, when subjected to high temperature, dissipated into acrid vapor’s that a diamond burnt away in air when strongly heated was demonstrated in a famous historical experiment carried out by the Florentine Academicians in the year 1694 in the presence of cosimo III, the Grand Duck of Tuscany. Using a Powerful burning glass, these Florentine worthies concentrated on a diamond the heat of the strong Italian sun. A high temperature was reached in this early solar furnace, and the diamond burned away, to universal astonishment. It remained however for the
great French chemist Lavoisier (executed at the time of the French Revolution) to prove for the first time the ‘acrid vapors‘ into which Boyar had burnt a diamond was, in fact, carbon dioxide gas and only this. 25

Diamond is relatively easily attacked by certain hot oxidizing compounds. It is found that if a diamond be heated to only 550°C in molten Potassium Nitrate, which is an active Oxidizing agent, it begins to be eaten away, due of course to Oxidation conversion to carbon dioxide. This eating-away mechanism is called etching. When exposed to the hot nitrate, after some minutes tiny little pits, triangular depressions, first from. These etch pits grow rapidly and then coalesce. After, say, all hour, the surface exhibits, a microstructure which a high-powered microscope reveals to be of striking block pattern very like a giant’s causeway in miniature. The crystal is then slowly and gradually eaten away if etching be continued, but the process is slow unless the temperature be raised some 200 or 300 degrees more. The nature of the etching depends upon which crystal face is being attacked. On the octahedron faces small triangular pits from, on the decahedron faces the pits are elongated and canoeshaped. While on the cubic faces they are square-shaped depressions. 26

Diamond is a very strong material and therefore resists compression. It has the best compressibility property of any known material. It resists compression four times better than iron and two times better than the very hard metal tungsten. It is twenty times better than its carbon relation, graphite. Because of this high strength, diamond points can sustain considerable loads; most people are aware of the use of small pointed sapphire rode and diamond rode as gramophone needles. While the sapphire is four times superior to test have shown that a diamond point of the same size as a sapphire point can sustain a load four times greater than the sapphire before cracking.

Yet despite this, great strength I have found that there exist a curious, weakness in diamond. If a ball-shaped diamond, or even a tungsten, carbide ball be pressed on to a flat diamond surface, whether natural or polished the relatively light load of only some 20 or 30 Ibs produces a minute, well formed,
hexagonal ring, shaped crack. This may is only 1/50th of an inch across, but such racks play a part in the failure of diamond machine-tools.  

Diamond has a second, unique thermal property. When anybady, whether gas, liquid, or solid, is heated it expands. A good metallic heat conductor generally has a high expansion of any known solid body. When copper or aluminium is heated, for each degree centigrade rise the length expands about twenty parts in a million. This sounds small but is easily measured. Changes in dimensions through heat expansion can have quite serious binding effects in machinery. Diamond only expands one part in a million for each degree rise and i.e. it is twenty times better than copper, brass, alumina, etc. from this point of view.

1.9.2 Optical Properties of Diamond:

Diamond has very special optical properties which are responsible for the brilliant adamantine luster and fire which makes the well cut diamond gem such an object of beauty and attractions. It takes on a very high polish both because of its hardness and its high reflectivity. When light enters at an angle off the perpendicular into any transparent liquid or solid, the path taken by the light deviates, i.e. the light is refracted. The amount by which the light is deviated is called the refractivity. The refractivity of diamond is extremely high indeed. Refractivity is measured in terms of a number, the refractive index, which depends a little on the colour of the light. For diamond it is 2 – 12, an index exceeded for yellow light it is for instance, 1-5 for glass and 1.76 for the gem sapphire, an index exceeded only by three somewhat rare and obscure minerals, anatase, brookite and retile, which in any case are not suitable for gems.

The reflectivity of a transparent solid surface is closely related to the refractive index and the higher the index the greater the reflectivity. When light falls perpendicularly on glass, only 4 percent is reflected back, but diamond with its much higher refractive index, has a much higher natural inherent reflectivity, about 18 percent being reflected back. So, when it is held in the light it looks brilliant. But there is a still more interesting consequence of the high refractivity and this concerns what is called total internal
reflection. As a consequence of the high value of refractive index, if any of the light which enters the crystal ultimately meets a face at an angle exceeding 24.5 degrees, it does not leave that crystal face but is totally and perfectly reflected internally to some other direction and in due course, by correct shaping it can arranged so that the light returns ‘Backwards’. This is cunningly exploited in a manner. The upshot is that by exploiting these optical properties on a correctly cut diamond, light is reflected, with brilliance comparable to that of a highly polished silver mirror. 28

Now all transparent material, in addition to refracting light, also exhibit what is called dispersion, that is the refractive Index is slightly more for the bluer component of daylight than for the redder. The different colours which constitute white light we differently refracted i.e. dispersed, and this is of course why a glass prism show, the colours of the rainbow. In diamond, the dispersion is specially high, about five times that of glass. So what is the result when light falls on the well cut diamond? First, 18 percent immediately reflected. Then the rest enters, but is largely reflected within the diamond and ultimately finds its way back to the eye of the beholder. But on its path it is strongly dispersed, i.e. split into brilliant, widely separated spectral colours. This, then constitutes the famous ‘fire’ of the diamond, the flash of spectral colour from the dispersed light spectrum.

If need only be added that fire is for more effective in flickering candle light than in daylight or electric light. The changes in angle of incidence of light resulting from the flickering candles make a diamond jewel warn in such light appear to be virtually alive and flashing with fire. Truly the thousand candles at Versailles, before the days of gas or electricity, must have brought out to perfection the brilliant fire of the diamond, worn by the ladies of the French court. Incidentally, because of the high refractive index of diamond there is a ready test available to the expert, by measuring this we distinguishes the genuine diamond from the fake. 29
1.9.3 Some Special Properties:

Even in 1664 Robert Boyle knew that sonic diamonds can give out light in the dark after being illuminated by daylight. There has actually been much traditional confusion about this property.

Some diamonds; phosphoresce, that is if they are brightly illuminated either by daylight or artificial light and are then taken into a darkened room, they continue to give out a glow which gradually fades away. Such phosphorescence is not a special property of diamond alone for it is also showed by many other crystals. It is closely connected with impurities in the crystals and is not a property of very highly purified, materials.

Some diamonds when rubbed in the dark will emit a glow, and this, too, is very closely related to phosphorescence. It is typical also of many other crystals carrying impurities. It is sometimes called triboluminescence and is by no means peculiar to diamond.

Now this is not the case with the natural green crystal for the colour here does not vanish when the crystal is moderately heated so one can distinguish, by heating, between the natural and the artificially induced green colour. The fact that such a distinction can be made night well influence the question as to whether or not artificial induction of colour will affect the value of the gem. A natural green gem, being all attractive rarity, fetches a higher price, as things are now, than the corresponding gem without colour, buyers have, however, a horror of synthetic or man-made effects where gems are concerned and if it can be demonstrated (as it call be) that a particular colour is man-made and not natural, it may well be that the man-made colour will not induce the buyer to pay the increase he would pay for the natural color. 30

When diamonds are over-dosed by irradiation the local shock of impact leads to a partial conversion into local fine graphite partials. Thus diamond is permanently turned black by this means and it also becomes opaque. Nothing can be done to repair such damage. There is some evidence that the very physical hardness of a diamond is also affected by exposure to radiation and this is not surprising, but the evidence accumulated so far with respect to this is rather flimsy.
Clear diamonds are transparent to ultra-violet, but it has been discovered that there exist two kinds of diamond which are conveniently called type I and type II. These differ by the extent to which they transmit the ultra-violet. Most diamonds transmit ultra-violet down to a certain wavelength they are opaque. (The visible spectrum stretches from about 4000 to 7000 A.U.). These are called type-I diamonds. Quite a small proportion, perhaps only one in a thousand diamonds, are transparent to still shorter wavelengths, beginning to absorb first at a shorter wavelength (2200 A.U.). These are classed as type-II among the type II are few very rare diamonds which are blue and have the surprising property of being able to conduct electricity. In fact, one known example can be made red hot by passing so much current. These diamond electric conductors (called type IIb) are extremely rare and have only been found very occasionally. The real distinction, between the common type-I and the rarer type –II is not yet fully understood and is the subject of much active study. Not only, do these two groups differ in their ultra-violet, transparency, they differ also in the way they transmit heat, i.e. in their infra-red transparency.

All diamonds, whatever their type, transmit infra-red heat radiation (up to a wavelength of about 40,000 A.U.) and beyond this absorb heat in certain wavelength bands. They again become fairly transparent to heat in still longer wavelengths, but here a difference crops up between the type I and the type II diamonds, for the type I (and only the type – I) have a particularly stronger absorption of radiation at about 80,000 A.U. historically the difference between the two kinds of diamond was first found from infra-red studies, but the ultra-violet absorption difference is easier to measure, so that usually one uses this to determine the type.

1.10 Popularity of Diamond Industry:

Popularity of Diamond industry has risen since the 19th century because of increased supply, improved cutting and polishing techniques, growth in the world economy and innovative and successful advertising campaigns. The most familiar usage of diamond to day is as gemstones used
for adornment a usage which dates back into antiquity. The dispersion of white light into spectral colours, is the primary gemological characteristic of gem diamonds.

In the twentieth century. Experts in the field of gemology have developed methods of grading diamond ds and other gemstones based on the characteristics most important to their value as a gem. Four characteristics, known in formally as the "four Cs", are how commonly used as the basic descriptors of diamonds: these are carat, cut, colour and clarity.

The various impacts of this popularity of diamond industry are as following…..

1.10.1 Distribution System:

Today, Presently Diamond processing industry have a very complex and long distribution system. The new strategy will bring reforms to this system, so that diamond will be both effective and speedily sold to the end consumers.

1.10.2 Advertising and Marketing:

The strategy will impact advertising and Marketing spend by involving sight holders in the marketing and advertising may increased resulting in increasing total sales of diamonds.

1.10.3 Increase Consumer Confidence:

The new identity given by the De Beer’s to their sight holders and the new hallmark through which diamonds will be sold to the end consumers will result in increasing consumer confidence.

All in all the new strategy will drive demand for diamond jewellery and transfer the industry which has been ‘ supply driven ‘ and researcher believe that India begin the world leader in this industry will stand to benefit more. 31

1.11. Diamond Industry in the world.

The present diamond trade has been started at 18th century. Africa is the legends fill the date from the starting. There was an individual ownership of mine owners on Kimberley mines. In the time of 1930 diamond industry was suffering with
a depression so to save the diamond industry from the depression, diamond industrialist and producers have established Central Selling Organization (C.S.O.). The central selling organization popularity known as the “Syndicate” handles and controls almost the entire production of gems and industrial diamonds of the world. It is the marketing arm of De Beer’s and acts on behalf on the world’s major Production centers. It employs near about 2000 workers. The C.S.O. is a collective name used to describe an international group of associated companies involved with the buying, valuing and selling of about 80% of the world’s rough diamond production. It acts on behalf producers on an entirely valunatory basis. Two of the most important companies in C.S.O. are….

(I) the D.T.C. which sorts and sale rough Gem diamonds.
(II) The De Beer’s Industrial Diamond Division “right” or sale to select the people are hold on south Africa, London and in Lucerne. 32

All over the world 80% rough diamonds are produced and sell by diamond producer association and C.S.O. in that most of the trade is done by D.T.C. London, is the main center of trading Information is also not available for the prices obtained for different varieties of diamond exported. Only a broad averages unit value realization be worked out this may not be useful.

India manufactures about 70% of the world’s diamonds, most of which cannot be processed in other centers. Each stones has to be treated individually which in not possible on automatic machine, Lately china, Thailand and Srilanka have started manufacturing these qualities.

1.11.1 Diamond mines in the world:

Diamond mines in the world are
(I) Angola
(II) Botswana
(III) Central African Republic
(IV) Ghana
(V) Ivory cost
(VI) Lithia
(VII) Libya
(VIII) Russia
(IX) Sierra leon
(X) South Africa
(XI) South west Africa
(XII) Tanzania
(XIII) Venezuela
(XIV) Zaire
(XV) India

1.11.2 Manufacturing Countries in the world.
(1) America
(2) Belgium
(3) France
(4) Holland
(5) India
(6) Israel
(7) Russia
(8) South Africa
(9) West Germany
(10) China

1.11.3 Trade Centers in the world.
(1) America
(2) Australia
(3) Brazil
(4) Canada
(5) France
(6) England
(7) Italy
(8) Japan
(9) South Africa
(10) West Germany
(11) India
CHART: 1.2

Global Diamond Industry Structure

Australia ➔ India ➔ USA
Australia (largest Diamond Producer) ➔ India (Biggest Diamond Processor) ➔ U.S.A (Largest Diamond Market)

1.12 Diamond Industry in the India.

Richest person were the legendary of diamond trade but now the whole scenario is completely changed. A normal person can also buy the diamonds. This is vitally for an Indian diamond Industry. Indian Diamond industry has changed its working system many times. Indian diamond industry stabilized against world diamond trade depression. It is remarkable that in 1993 the whole world is sunking into the depressing but Indian has saved the world. 34

The Indian diamond industry has cornered a 55 percent share of the world market by value. This is in large measure, due the efforts at the micro level the contribution of all the artisans, a manufacturers and traders making the country’s diamonds all over the world. The gem and jewellery industry as a whole has also reached a new high in the financial year 1999-2000.

All exporters, especially the award winners have played an important role in this achievement. Those in the cut and polished diamond sector, particularly, have realized a good growth.

1.12.1 Diamonds Mines:

Diamonds are thought to have been first recognized and mine in India (Golconda being one of them), and other found along the river penner, Krishna and Godavari. Diamonds have been known of India for at least 3000 years but must likely 6000 years. 35

Now a day, In India diamonds are mined only in M.P, Andhra Pradesh and Orissa but it is very low.
1.12.2 Diamond Processing in India:

The major supplier of diamonds into the Indian market is the Rio Tinto-controlled Argyle mine in western Australia, followed by De Beer’s / CSO diamonds and a small but growing illicit trade in diamonds smuggled out of Russia. While De Beer’s now admit that there is a child labour problem in the sector in India, they claim that they do not use cutters who exploit child labour. During recent parliamentary hearings in South Africa, De Beers pointed to the Rio Tinto-controlled Argyle mine as “Supplying many of the Indian cutters” (Mail and Guardian, South Africa, 22 August 1997).

Diamond cutting and polishing is concentrated in western India in Mumbai, Surat, Navasar, Bhavnagar, Ahmedabad and has recently spread to parts of Southern India. Mumbai is the primary centre for diamond imports and exports, including some diamond factories which are operating in the Santa Cruz Electronics Export Processing Zone (SEEPZ). While the sale and production of diamonds is monitored through Mumbai, 60% of the cut and polished diamonds exported from India are handled in and around Surat. There multitude of sub-contractors, organized on a Pyramid structure process vast quantities of Diamond.

In 1995, imported 92 million carats worth of diamonds to be cut. India cuts and polished 70% and 40% of the global diamond yield in terms of weight and value, and because of this has the world’s largest workforce involved in the trade, with about 8,00,000 people engaged in diamond cutting and polishing and as many as 7,00,000 involved in other aspects of the diamond trade. Wages equal just 1% (or less) of the whole sale price for which each diamond is sold, and most workers do not receive any social benefits. The vast majority of the workforce some estimates are as high as 95% is not organized into any Union, and workers incomes often depend on whatever the employer or middle-man decides to pay them. In many cases, workers trying to organize or join unions have been dismissed and even threatened with guns. Because of its reliance on traditional labor intensive methods the Indian diamond cutting industry has concentrated on small diamonds with low value and low risks.
Today the diamond industry of India is mainly export oriented. Diamonds are cut and polished from all over the world. The export trade is in the hands of small & big traders.

1.12.3 Diamond Trade:

It was only from 1966 onwards that Indians started to capture the Belgium business in eight cut manufacturing and the country regained its position as a centre of the cutting and polishing industry.

When India became independent in 1947, foreign exchange requirements for numerous industrial developments were projected. And priority over all other demands was considered restricting which placed on the import cut and polished diamonds into the country. By 1952 only 1.5% of the peak import of cut and polished diamonds was granted to established importers.

It was during the post independence period when certain enlightened entrepreneurs rose to the occasion. The pioneers in this movement were H.H. Javeri, H.B. Shah and Mohandas Raichand & Sons who established the first up-to date factory in 1949. Nearly 300 well trained artisans in cutting and Polishing worked in Surat and Varanasi. Some like Liloobhai and Shantibhai were intelligent and of exceptional skill. They however depend on suppliers from local mines and old miners imported from Burma and local collection.

The local market was enough to absorb the company’s entire production which was mainly in size, subsequently the import of rough diamonds was freely permitted within certain parameters.

Accelerating inflation low rates of speculation and overseas investments are larger than better goods. Especially during 1973-74 and 1978-80 consumer market was worldwide expanded during this decade and Middle East markets including Iran sugged during 1976 to 1981.
1.12.4 **Historical background of Diamond business.**

India was the sole source of diamonds in the world until the discovery of diamonds in Mines Gerais, Brazil in 1725. The Krishna River valley was extensively worked for diamonds in alluvial places and conglomerates by open cost working shafts, which were inter connected along diamond ferrous layers.

In the early times, Varanasi was the main trading center for diamonds, Madras took the top position. More recently Bombay has emerged as the largest trading center for diamonds in India. 37

- **Pre Independence period.**

During the British rule, India was using indigenous rough diamonds though some rough diamonds were also imported from Belgum. An important aspect to be remembered is that were no restrictions on import of out as well as polished diamond till 1947. In July 1947, just before independence all imports of diamond were stopped.

- **Post Independence period.**

After independence the Indian diamond industry was almost nonexistent due to near non-availability of imported rough stones and negligible indigenous production of rough diamonds. Certain factor’s operating in the international markets were also responsible for this slow growth. First the gold smith (Zaveri) community that had settled in Israel developed their diamond Industry. Belguim re-established it self as an important diamond cutting and trading country. But these developments not with standing, the markets for diamonds had not yet developed in the world. The growth of diamond trade and industry was therefore slow.

India used to receive hard and small roughs as row material which was difficult to cut and polish. These roughs were however, uneconomical for other countries looking to their technologies and skills of workers and therefore, were sold to India as industrial diamond Indian cutters started cutting and polishing these diamonds in such supply of roughs initially created demand for small diamonds in the international markets. The first modern Indian diamond cutting factory was established in Bombay by pioneering entrepreneurs like H.B. Shah, Mohanlal Raichand and sons and H.H. Zaveri.
They took the help of a Belgium, Pie se De winew in setting up cutting and polishing operations.  


- **Structure:**
  
  Today India is main centre for processing of diamond, i.e., making cut & polished diamond from roughs. India processes 100 mm (million) carats of rough diamond against the world total out put of 117 mn (million) of rough diamonds. Indian diamond industry is country’s second highest foreign exchange earner after textiles. Today, it contributes about one fifth of the country’s exports. The diamond Industry in India is structures as diamonds jewellery and precious/semi precious stones. These segments and farther divided into sub segments. It is shown below in the chart.

**Chart: 1.3**

![Indian Diamond Industry structure](source)

- **Size:**
  
  Indian diamond Industry is country’s second highest foreign exchange earner after textiles. One of India’s leading foreign exchange earning sectors Gem & Jewellery sector accounted for 16.67% of India’s total Merchandise Export Volume of exports pegged at US $ 43139.24 Million as of march-2011. The percentage increase over financial year 2010-11 is 46.89%.

  India Gem and Jewellery exports are expected to grow at a whopping 15% to 20% in financial year-2011-2012.  

  In short the industry has been growing at 15-17% annually since last few years. At present export 95% of the world’s diamonds.
Ascertain India’s leadership position in the global arena.

➢ **Growth:**

Over four decades ago the Indian diamond industry was small and concentrated on processing last 3-4 decades it registered a phenomenal growth. Last four years, specialy years 2006, 2007, 2008 and 2009 figure show that growth rate slightly reduced. The Indian industry had been unable to adopt to changing global conditions resulting in accumulation of stocks, Multi-channel purchasing system needs to be accepted. International market conditions are also affecting and important markets like Japan, Singapore and Golf countries have shown sluggish demand.

**Table: 1.1**  
**Growth of Indian Diamond Industry**

*Export of Rough and Cut & Polished Diamonds  (Value: US$ in Million)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Rough Diamonds</th>
<th>Cut and Polished Diamonds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>1772</td>
<td>23356</td>
</tr>
<tr>
<td>2010-11</td>
<td>1137</td>
<td>28221</td>
</tr>
<tr>
<td>2009-10</td>
<td>744</td>
<td>18224</td>
</tr>
<tr>
<td>2008-09</td>
<td>776</td>
<td>14804</td>
</tr>
<tr>
<td>2007-08</td>
<td>567</td>
<td>14205</td>
</tr>
<tr>
<td>2006-07</td>
<td>565</td>
<td>10910</td>
</tr>
</tbody>
</table>

Source : (Gem & Jewellery Export Promotional council)
Table : 1.2
Growth of Indian Diamond Industry

Import of Rough and Cut & Polished Diamonds (Value: US$ in Million)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rough Diamonds</th>
<th>Cut and Polished Diamond</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011-12</td>
<td>15163</td>
<td>14472</td>
</tr>
<tr>
<td>2010-11</td>
<td>11994</td>
<td>20808</td>
</tr>
<tr>
<td>2009-10</td>
<td>9048</td>
<td>11610</td>
</tr>
<tr>
<td>2008-09</td>
<td>7960</td>
<td>8982</td>
</tr>
<tr>
<td>2007-08</td>
<td>9797</td>
<td>5461</td>
</tr>
<tr>
<td>2006-07</td>
<td>8767</td>
<td>2027</td>
</tr>
</tbody>
</table>

Source : (Gem & Jewellery Export Promotional council)

Above Table 1.1 and 1.2 showed the export and Import figures of cut & polished diamonds from 2006 to 2007. It shows continuous increase in 2005-07 to 20011-12. Than after 2006-07 to 2011-12 figures shows continuous increase. In 2011-12 figures shows super high. This figures indicated the economic value of GDP of our-country.

U.S.A., Hongkong, Japan, Belguim, Thailand and Israil, U.A.E. and U.K. have been the major markets for exports of Gem and Jewellery above chart : 1.1 and 1.2 shows the world export and import of Indian Gem & Jewellery.
1.12.6   SWOT analysis of Indian Gem & Jewellery Industry:

- **Strengths:**
  - One million craftsmen associated with it. Their skills can be harnessed for designing and making modern jewellery.
  - Abundance of cheap and skilled labour in India.
  - Excellent marketing network spread across the world.
  - Supportive government industrial/Exim policy.

- **Weakness:**
  - High domestic interest rates compared to elsewhere.
  - Small firms lacking technological/export information expertise.
  - Low productivity compared to labour in China, Thailand and Srilanka.
  - As the major raw material requirements need to be imported, companies normally stock huge quantities of inventory resulting high inventory carrying costs.

- **Opportunities:**
  - New markets in Europe & Latin America.
  - Growing in South asian & far East countries.
  - Removal gold control act.

- **Threats:**
  - China, Srilanka and Thailand’s entry in small diamond segment.
  - Infrastructural bottlenecks, frequent change in exim policies, irregular supply of gold.
  - Over dependence on single-channel supply chain. Decisions of De Beer’s and Argule’s term for renewing their supply contract.

1.12.7   Importance of Diamond Industry in India :

Any country where as the plenty of works, in these countries diamond industries are proved like blessings.

Diamond Industry has lion’s share in India gems & jewellery exports. Export of cut and polished diamond is almost 81% of total gems & jewellery.

India is considered to be one of the world’s largest centers for cut & polished diamonds. Indian cut and polished diamonds account for about 45%
of international diamond production in value terms and 70% in terms of carats. Although, India produces about 33000 carat of rough diamonds, the cut & polished diamonds produced by India account for 70% of 1104 Million carats of world cut & polished natural diamonds, i.e. 800 million carats of cut & polished diamonds.

In these industries the very need of people get their income. In India where the cheapest labourer cost, where the cost. Where the cost of finished diamonds are the cheapest than other countries. So, in foreign business we get more benefit and these benefits are used in human resources, so the revolution in the human life style.

This clearly shows that Diamond polishing industry in India is very significant.

1.13 Diamond Processing Industry in Gujarat.

Gujarat is a state of India. It was existed in 1st May 1960. Geographically Gujarat is divided into North Gujarat, South Gujarat, Saurashtra and Kuchchh. According to Indian population census 2011, the population of Gujarat was 5.50 crores – In that population 51.70% were male and 48.30% were female. The percentage of the people who are living in the villages and cities is 34.49% and 65.51%.40

As the time of the establishment of Gujarat state, Gujarat held the 8th position in the terms of industrial development, is an important features of the economic and industrial development of Gujarat state, the establishment of refineries have changed the scenarios of Gujarat. Many other factors have played an important role in the all round development of Gujarat. Among these contribution factors are the Mumbai, Baroda, and Ahmedabad Broad gage railway line, beautiful highway, rivers, big cities as well as social and industrial facilities and also labour resources, all these factors have lead Gujarat in the foremost position.

Gujarat diamond industry has made a history in diamond business. World’s main placed of diamonds is Belgium. If the Belgium sneezes the diamond industry of whole world are fevered. The first placed of the business
of diamonds Yahudis, but the change in the recent position, today diamond business handover Kathiyawadi Patel’s and Palanpuri Patel’s. In this way of progress, license system entered and plenty of traders get the permission of rough diamond import and export that of cutting & polished increased after that position.  

1.13.1 Employment opportunities:

Now a days Gujarat diamond industries provided direct employment to 15 lakhs and indirect employment to the 35 lakhs and IT employs about 15 lakhs people directly and provides employment opportunities to more than 25 lakhs people. Their wage bill comes to Rs. 1500 crore per annum. An investment of Rs.5 core in this sector creates an employment far 1000 people.

The industry has major employee near about 25000 factories in Gujarat. Diamond industrialist are doing there diamond business by near about 2000 to 2500 offices. In Surat near about 2 Lakh people are getting employment in near about 10,000 factories. In Gujarat most of the rough diamonds are cutting in Surat. Surat is Manufacturing 4 lakhs diamonds daily, there are three big diamond trade market in Surat.

The processing capacity of each unit ranges from 4 to 400 carats, while production capacity depends on the types, shape and size of the diamond, it is also depends on the skill of workers.

It is the important to note that the Indian manufacturing centre is now capable of producing the entire range of goods required by the market. It has in the last three or four decades emerged as the leading manufacturing centre with the support of De Beer’s and Argue. It is in the interest of the industry that these producers ensure that a regular rough supply continues to flow in to the country.

However, the industry cannot grow with only DTC sight holders, there are many more people involved in the diamond industry today, whose contribution to the industry is important as well. In this context, the annual meetings De Beer’s holds at various centers are significant. Wages equal just 1% (or less) of the wholesale price for which each diamond is sold, and
workers, income often depend on whatever the employer or middle-man decides to pay them.

There are about 7000 different types of diamonds. The processing is done through ingeniously manufactured and manually operated machined, but started the IT era in India. The diamond industry is fully computerized. Many diamond firm is used to automatic computerized machine for diamond cutting. Many firm organize training centre for cutting and polishing of diamonds

1.13.2 Foreign Business:

(I) Export

In the time of 2005-06, India exports the diamond and income of diamond industries are US $ 17000 million. Annually six thousand million dollars in diamond market. India parted with 8% as the third rank. Here America’s part is 50% and Japan’s part is 11%. Total diamond market of India Rs. 7590 crores, in Gujarat’s market is Rs. 3500 crores. Gujarat play the important role of total export of India. In Gujarat the scope of diamond industries are very hopeful and all the facilities to progress this business is available in Gujarat.

Table – 1.3

NET EXPORTS OF GEM & JEWELLERY (US $ in Million)

<table>
<thead>
<tr>
<th>Items</th>
<th>April-2011 Provisional</th>
<th>April-2010 Same part as current year</th>
<th>% Growth Over the previous years</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cut &amp; Pol Diamonds</td>
<td>2035.22 (49.45)</td>
<td>1928.60 (53.84)</td>
<td>5.53</td>
</tr>
<tr>
<td>(Quantity in lakhs &amp; carats)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Gold Jewellery</td>
<td>153.33</td>
<td>180.22</td>
<td>- 14.92</td>
</tr>
<tr>
<td>3. Jewellery &amp; Gold Medallion</td>
<td>870.63</td>
<td>848.16</td>
<td>2.65</td>
</tr>
<tr>
<td>4. Colour Gem stones</td>
<td>16.60</td>
<td>10.98</td>
<td>51.18</td>
</tr>
<tr>
<td>5. Export of Rough Diamonds</td>
<td>24.86</td>
<td>78.98</td>
<td>20.11</td>
</tr>
<tr>
<td>Total Exports</td>
<td>3100.64</td>
<td>3046.94</td>
<td>64.55</td>
</tr>
</tbody>
</table>

Source: (Gem & Jewellery export promotional council)
Above data indicate the figures of export. Figures released by Gem & Jewellery export promotional council during April-11 is compared to same period last year. The year 2010-11 showed cut & policed diamonds export of US $ 2035.22 Million, indicating growth of 5.53% compared to US $ 1928.60 million in April 2010. Other items growth rate is indicating high but April-11 Gold Jewellery export decrease US $ 26.89 million, (~14.92%) growth over the previous year compared to April-10. In short over all growth 64.55% increase compared to previous year.

The data shows itself importance value of Gujarat Economy.

(II) Import:

India processes small diamond using imported raw material. Most of rough diamonds that are cut in India are imported from abroad. Once the rough diamonds level the mines, they are distributed through the DTC to their sight holders in Antwerp (the major rough diamond market) to the diamond manufacturers at the various cutting centres.

In the part few years, new sources of rough, from Australia, Rassia, Canada and part of Africa considerably Changed the controlled single market system in a number of ways. Also a significant quantity and variety of “out side” rough has always been sold on the open market in Antwerp, and rough from some of mines, continuous to go directly to a selected number of diamond manufacturers in the cutting centres.

Rough diamond found in India also. In December 2005 a 27.3 carat rough diamond was found at the majhagwan mine in the panna district of the North-central Indian state of Madhya Pradesh – “The Indian rough stone is of excellent colour and clarity. “ Its value is estimated at 8 million rupees ($173000) and year 2006, a 30.4 carat rough found at some mine. Its value is 9.5 million rupees ($2,06,000). 44

Today India imports over 75% of all rough diamonds produced in the world. Table: 1.3 below shows the world imports rough diamond in India.
Table – 1.4  

NET IMPORTS OF GEM & JEWELLERY  

(US $ million)

<table>
<thead>
<tr>
<th>Item</th>
<th>April-10 to March-11 (Provisional)</th>
<th>April-09 to March-10 Same part as current year</th>
<th>% Growth over the Previous year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rough Diamonds</td>
<td>11924.91</td>
<td>9045.80</td>
<td>31.88</td>
</tr>
<tr>
<td>2. Gold Bar</td>
<td>8275.63</td>
<td>7165.07</td>
<td>15.50</td>
</tr>
<tr>
<td>3. Others *</td>
<td>230.14</td>
<td>159.71</td>
<td>44.10</td>
</tr>
<tr>
<td>4. Cut &amp; Polished diamonds</td>
<td>20774.38</td>
<td>11609.63</td>
<td>78.94</td>
</tr>
<tr>
<td>5. Others **</td>
<td>720.23</td>
<td>552.17</td>
<td>30.44</td>
</tr>
<tr>
<td>Total Import</td>
<td>1330.29</td>
<td>28532.38</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Gem & Jewellery export promotional Council)

* Data of rough col. Gemstones raw pearls.
* Data of gold finding/Mounting/casting & Gold Jewellery.

Above data indicate the figures of import of Gem & Jewellery items during April-2010, March-2011 as compared to same period last year (April’09 – March – ’10). The year 2010-11 showed rough diamonds import of US $ 11929.91 million, indicating growth of 31.88 % compared to US $ 9045.80 million in 2009-'10. Others items and cut and polished diamonds growth rate is indicating high. In short overall growth 46.96% increase compared to previous year.

In order to ensure that India is in line with the international community, the council has formulated some steps which are mandatory on every import. All diamonds that are imported have to be accompanied with an invoice declaring that they are not from any conflict area. This measure has been taken so as to ensure that the diamonds imported into the country do not originate from any conflict area.

According to researcher. The upward trend in exports for the diamond industry here has been able to revive economy, the need is to go for value addition for the industry.
Conciderabley Jewellery are priced nearly 10 times more compared to diamonds hence more Jewellery production would mean substantial increase in the export of the precious metals from here which is Rs. 36000 crore per annum at present.

1.13.3 **Government Policies and Bank finance** :

The Indian government’s Ministry of commerce and Ministry of Finance have always co-operated with council and whatever measures have been required to enhance exports have been taken by them. The introduction of the diamond dollar account especially is a tremendous contribution in taking the industry ahead and to help make India a trading centre. The constant support from the government policy change have had a beneficial impact on the Indian diamond Industry. 45

- **Government policies** :

  The Diamond industry is well supported by government policies and the banking sector-around 50 banks provide nearly US $ 3 billion credit to the Indian diamond industry. And EXIM policy time to time change in recent position of the diamond industry, through MOF.

  Indian diamond industry, Government of India sponsored institution has been recognized now world over and has placed in the FTP as a diamond certification and grading laboratory, which is matter of great pride and pleasure for community of the country as a whole. The laboratory services has been also certified by an ISO-9001 : 2000 quality compliment over & above, the latest equipment, which is nowhere exiting in the country today, were imported & IDI’S laboratory was equipped with. Thus, IDI’S lab in country worth placement in the FTP.

- **Bank Finance** :

  The strong support of financial institutions in the country has been a corner stone of our business. However, there are some peculiarities of the diamond trade. All banks are aware that export bills are realized within 120-150 days from the date of shipmen.
We market a luxury item and service and credit are very important, especially as overseas offices require holding large stocks for their marketing purpose.

Presently, a penal interest rate of 25 percent is changed on overdue bills even within 180 days. Looking at the peculiarities of this business and the lower interest rate internationally, the RBI should allow normal interest rate on export finance up to 180 days. The levying of penal interest rate of 25 percent increases operating costs and makes exports unviable. 

1.14 Key characteristics of Diamond Processing Industry in Gujarat:

1. Most of units are in cottage and small sector.
2. Traditional business approach.
3. Family owned business.
4. Labour intensive & not capital intensive so more entrepreneurs, more employment.
5. Wholly work depends on electric power, no electricity, no work.
6. Based on imported raw materials.
7. Uses inherited skills of domestic workers.
8. High working capital as high inventories.
9. The technology and skill required for cutting and polishing of diamonds have been largely developed within the country and at industry’s own costs.
10. Most of the diamond dealers are interconnected with each others and have developed a collective interest in achieving higher and higher export targets.
11. Vast manufacturing base and marketing network.
12. High level of product innovation.
14. Large volumes, wide varieties and economical costs.
15. Infrastructure facilities in terms of.
1.15 History & Development of Diamond industry of individual cities under the studies:

Diamond worker’s were scattered in all around the Gujarat and Nation i.e., rural and urban areas. But researcher has selected only 6 cities of Gujarat state’s like Surat, Ahmedabad, Bhavnagar, Amreli, Navsari, Junagadh. So, the study has been carried - out in one state.

1.15.1 Diamond Industry of Surat city:

Surat city is the India’s speedily development city and going to become the central point of the famous to make cut and polished diamonds from 5 cent weight. This work is running a special region named varachha road of the Surat city. Today Near about 6 lakhs or 10 lakhs diamond workers are Saurashtra’s Patel. They are owner of the factory, diamond traders and local retailers. They have their participations is Mumbai, Hongkong, Newyork, London and Antwarp based diamond industry.

Populance of Surat is increased after independence growth in the population of the Surat city is depend on progress of its two main business sector, textile and diamond. Most of the diamond factories are situated near the Sardar Chowk of Varachha Road,

Diamond factories were started in 1950 in Surat and Navasari. In the initial period of this business the trading side of this business was in the hands of Palanpuri Jain Vanik. In India this business has started the fruits of success with growth due to the low wage rate. The owners who have started their factories among 1970 to 1980 became instantly richer. That was the golden period for Surat diamond industry but the main problem create during this golden period. They have to face was scarcity of skilled workers. There was higher demand of polished diamonds. At that time Saurashtra people entre into this business.

Today particularly Surat, processes 9 out of 10 diamonds in the world. About 95% of the $ 28 billion worth of polished diamond exported in 2010-11 were cut and polished in Surat.47 “Surat is manufacturing 4 Lakhs diamond daily“ – Diamond Digest.
1.15.2 Diamond Industry of Ahmedabad city:

Ahmedabad city is a mega city of the India, and going to become the central point of National Highways and business in India. Ahmedabad well known in the world its IIM, ISARO, DRL, Cotton Cloth Industry and Diamond Industry. Most of diamond factories are situated the Bapunagar at Naroda highway.

In Ahmedabad most of the diamond units were started during 1976 to 1980. In the initial five years the growth of diamond industry was very slow. Most of the single cut works of done in Ahmedabad. Single cut units were producing less diamond pieces than double cut.

In Paralal Diamond unit are started in Ahmedabad’s talukas and villages.

1.15.3 Diamond Industry of Bhavnagar city:

Bhavnagar city of the Gujarat state is speedily developing city. This city has specific history at Independent time of India. Bhavnagar diamond business is widened in city and all the taluka’s and in all the villages. There are 5000 diamond factories, providing employment to 5,00,000 people. Most of diamond factories are situated the Gauri Shankar Talav Area. Internally and externally out of the total unit, only 60% are in Bhavnagar and rest 40% are spreader in Botad, Mahuva, Savarkundla, Gariyadhar and Palitana.

1.15.4 Diamond Industry of Amreli city:

About Amreli out of total population near about 30% to 40% people are engaged in diamond business. There are 1200 factories providing employment near about 30,000 people there are 1000 women workers also working in this business.

Out of the 10 talukas diamond business is developed fully in 7 talukas. In Amreli, Chital, Babara, Lathi, Lilya, Damnagar, Varsada, Dhari Gariyadhar and Ishwariya are much developed.

1.15.5 Diamond Industry of Navasari city:

Diamond factories were started in 1950 in Surat, equal and paralal in Navasari. Today Navasari diamond business Provide sound base competition with Surat diamond business.
The diamond business widely scattered in all around the Navasari region. There are 5000 factories provide employment near about 2 lakhs people. No of case study studied on Navasari diamond industry.

1.15.6 Diamond Industry of Junagadh city:

Junagadh is a historical city of Gujarat states. The oil mills,, The diamond industry, The Ostin Engineering co. etc… are noticeable developed in this city.

The diamond Industry in Junagadh was started under the title khodiyar Diamond in 1984 by Mr. V.D. Patel. The diamond industry comprises of about 200 unorganized units of cutting and polishing. This industry provided employment to about 10,000 people are directly. Most of diamond industry are located in Ambavadi (Joshipura) and other unit located in Timbavadi and near to KIva chowk (Datar road).

Thus diamond business is important to provide employment to the world, Nations, States, Districts, Talukas and Villages.

1.16 Problem area for the Industry:

This is a major industry of Gujarat state and its growth has played a major role in the economy of Gujarat. 80, the researcher decided to take-up research work on this industry. This Thesis deals with workers problem vis-à-vis job satisfaction trends of diamond industry of Gujarat state. According to census of India 2001 near about 95 lackh people were doing economical activities in Gujarat which was increased by 5% in 2011, (about 1 crore people). This ratio is different in different types of areas. Most of the workers are getting employment from unorganized sector. Near about 86% people in Gujarat are getting employments through unorganized sector. It is sure that unorganized sector is keen for providing employment to unemployed people. The number of employment will be increased in unorganized sector in near future and diamond industry will be an important player lack of capital in experienced and untrained workers are basic constrains of the diamond industry, but it provides more employment on per capita investment. Diamond industry provides more
employment with least capital and less education. Diamond business provides more employment to be the illiterated and less literate people.

Diamond industry is providing not only direct employment, but also indirect employment are exporter, workers in mines, workers related to diamond studded jewellery, workers related to diamond cutting and polishing industry etc….

The working hours of diamond processing centers are flexible and very from one unit to another. Usually, the total working hour ranges from 7 to 10 hours, starting from 7.00 am to 11.00 p.m. The workers are paid on monthly basis, but their wages calculated on a piece meal wages rate. The piece rate varies for each diamond at different stages; it also depends on the shape and quality of diamond.

During the training period workers are not get remuneration. During the initial training period one or two months, workers performance are good, getting job in the diamond units. The wages paid to the workers in the diamond industry is more lucrative compare too many other industry.

Diamond cutting and polishing is hazardous, were the hazard includes painful burns from the sparks generated while cutting, polishing and shaping the diamonds, hands, head injury, stresses to the head and cum loud noise, heat crowded spaces and working under glad of sot light over the work table contribute to a very stressful work environments.

1.17 Conceptual framework of Job - Satisfaction

Human resource has the greatest potential to develop and grow provided the right climate is provided to them. Human resource management is an important aspect of an organization. It is process of binding people and organization together so that the objectives of each are achieved. The important objective of human resource management is to enhance job satisfaction and self actualization of employees by encouraging and assisting every employees to realize his full potential. Job is regular activity performed in exchange for payment. Job satisfaction is to assess how people feel about their jobs. It is the extent to which people like
(satisfaction) or dislike (dissatisfaction) their jobs; it can be also a reflection of good treatment and an indicator of emotional wellbeing. Satisfaction is to the extent that a person’s job fulfills his dominant needs and is consistent with his expectations and values. Job satisfaction is concerned with several attitudes about the job characteristics, compensation, benefits, status, social security, advancement opportunities, technological challenges and respect.

For the success of any organization Job-Satisfaction is of vital importance. The employees who are satisfied are the biggest assets to an organization where as the dissatisfied employees are the biggest liabilities. The organization cannot achieve its goals and targets unless its workforce who constitutes the organization is satisfied with its Job. Job-Satisfaction plays an important role for the happiness and prosperity of the individuals and organization that has employed them.

1.17.1 Meaning & Definition Job Satisfaction:

Job-satisfaction is the favorableness or unfavorableness with which employees view their work. Employee attitude, job satisfaction and industrial morale are often used synonymously but they are not same. A favorable attitude may contribute to job-satisfaction because job satisfaction is the result of so many attitudes likewise job satisfaction and morale do not carry the same meaning, though job-satisfaction improves the employee-morale. Job-satisfaction may refer to a person or a group. An individual or a department may perform the job satisfactorily unsatisfactorily. Job satisfaction may also apply to part of an individual job.

According to Hop pock, which was pioneer explaining job satisfaction, job-satisfaction is a combination of psychological and environmental circumstances. It is an amount of overall positive effect or feeling that an employee has to works his job. It is the end, state of feeling.

Workers have several sets of needs which they try to fulfill and to concentrate to several job factors like pay, work itself, promotion and co-workers. Job satisfaction may be a resultant feeling of satisfaction which the
employee achieves by gaining from job and what he expect from it to satisfy his need.

It may be a function of the need strength or expectation and the potentiality of the job to provide for the fulfillment of needs. The stronger the needs, the more closely will be the job satisfaction, depends on the its fulfillment.

According Vroom, job satisfaction is the positive orientation of an individual towards all aspects of the work situation. It is the resultant of host of orientation to specific aspect of the job.

Evans2 refers to the four combination used to denote job satisfaction.

(A) Overall job satisfaction is the sum of job facet satisfaction.

(B) Overall job satisfaction is the sum of the product of facet satisfaction and job facet importance.

(C) Overall job satisfaction is the sum of differences between goal aspiration and goal attainment and,

(D) Overall job-satisfaction is the sum of the product or goal importance and the difference between goal aspiration and goal attainment. Thus aspect are shown in chart no.2

In this definition, behavioral aspects and job-satisfaction which influence each other is clearly painted out by evan. Evan found correlation between satisfaction with different components of job and overall job-satisfaction.

Above model also help in calculating job-satisfaction by multiplying the value of job out comes with the instrumentality of job for their attainment.

1.17.2 Importance of job satisfaction for worker and organization

According to Andrew Carnegie, men power is very important at work place. If people are very important in management, their behavior is also getting more important in organization.
Job-Satisfaction, a workers sense of achievement and success is generally perceived to be directly linked to productivity as well personal well-being. Job satisfaction implies doing a job and enjoys, doing it well, and being suitable rewarded for one's efforts. Job-satisfaction further implies enthusiasm and happiness with one's work.

Tangible ways in which job-Satisfaction benefits the organization include reduction in complaints and grievances, absenteeism, turnover and termination, as well as improved punctuality and worker morale. Job-Satisfaction is also linked to a healthier workforce and has been found to a good indicator of longevity. It has relation with many aspects because it affects a person's mental health, physical health and increase output.

1. **Mental Health**

   If a person remains continuously dissatisfied with the job and not enjoying the job, the job become burden far that person and burden also leads many diseases related to mental health.

2. **Physical Health**

   Job Satisfaction affects the Physical Health of the person. If a person is under continuous stress, he/she will suffer from health problems like headaches, heart and digestion related diseases etc.

3. **Increase in Out Put**

   The Output automatically increases with Job-Satisfaction because when a person is happy with his Job Situation he would like to put more effort in his work, which in turn will increase the output.

   Satisfaction is associated with factors that have to do with work itself on to out comes directly derived from it, for example, the nature of the job, achievement in the work, promotion opportunities and chance for personal growth and recognition. These factors are associated with high level of job-satisfaction hence they are motivators. This is also supported by the four Ps of the job satisfaction which serves four interests as depicted below:
The four Ps of Job-Satisfaction.

1. **Physical Interest**: Physical interests encompass working conditions, nature of Job, Salary and Company benefits.

2. **Psychological Interest**: Psychological interest include emotions, Job security, self-esteem, trust and recognition and work environment.

3. **Political / Social Interest**: These include labour union affiliation and corporate Social Responsibility (C.S.R).

4. **Personal Development Interest**: These include availability of training and development programmers, innovation and growth prospects.

### 1.17.3 Significance of Job satisfaction

Job-satisfaction has been achieved through the major perspective like, industrial engineering, Human relation movement, work itself. Industrial engineering considers the impact of working conditions and pay on job-satisfaction like piece rate system, work design etc. During second phase, the supervisor plays the determining role in job satisfaction and lastly the work itself becomes relatively the major source of job-satisfaction.

Generally it is proven that pay, work itself, skill and ability, promotion, supervision, work group and working conditions are the major source of job-satisfaction. Job satisfaction broadly covers interpersonal and institutional factors. Aspect of the job situation such as job security, freedom and authority and chance for promotion are very significant. The motivation to work may be the expression of the individual needs to engage himself in useful activities, to earn, to lead comfortable life or to be able to exercise power and authority which in varying degrees are inherent in job situation. The extent to which the job provides opportunities for meeting the economical, social and Psychological needs of the employees, will determine their job satisfaction, since work is always performed in a social context, the quality of relationship with superiors, colleagues and subordinates is very important. The interaction between people at work which set the tone of functional and social
relationship is a factor which also determines the satisfaction associated with job performance.

- **Benefits of Job-Satisfaction**
  
  There are major benefits of job-satisfaction of workers.
  
  - Because of healthier and satisfied employee become profitable for the organization.
  - Trained the employee effective and efficient for facing the competition of business.
  - More positive feeling to word one's i.e. improved job-satisfaction and involvement.
  - More positive feeling toward the Organization goals.
  - Improved physical and psychological health.
  - Aerotor growth and development of the individual as person and as a productive member of the Organization.
  - Decreased absenteeism and turnover and less accident.

- **Method of the Measuring Job Satisfaction.**
  
  There are many methods for measuring Job-Satisfaction. Here researcher used Likert scaling methods. This is the common method for collecting data regarding job-satisfaction is the Likert Scale(named after Rensis Likert). This method include Yes / No questions, True / False questions, point systems, check lists and forced choice answer.
Above picture helps us understand the nature of job - satisfaction. The above frame works comprise six steps. Job-Satisfaction process as shown in the figure begins with the individual's needs (step - 1). Needs are felt deprivation which the individual experience at given time and as energizers. The needs may be psychological or social (e.g. The need far water, air, or food and the need far friendship). These deprivations force the individual to search far ways to reduce or eliminate them (step - 2). Job - Satisfaction is goal directed (step - 3). A goal is a specific result that the individual want to achieve. An employee's goal is a specific result that the individual want to achieve. An employee's goal is often driving force and accomplishing those can significantly reduce needs.
Employees striving to advance may seek to work on major problems facing the organization in order to gain viability and influence with senior managers (step-4). Promotions and raise are two of way that organizations seek to maintains behaviors. They are signals (feed back) to employees that their needs for advancement and recognition and their behaviors are appropriate (step-5). Once the employees have received either rewards of punishments, they reassess their needs (step-6)

- **Job-satisfaction and productivity.**

  Normally job-satisfaction leads to higher performance or productivity. A well satisfied worker will take initiative in increasing his productivity. But researches have proved that this assumption is not always correct. For example, a satisfied worker may be high or low or average producer. Being influenced by several intervening variables such as reward the relation between satisfaction and productivity is complex.

  Job-satisfaction and performance have insignificant correlation. Sometimes it is difficult to know whether job-satisfaction leads to higher productivity or it is higher productivity leads to better job-satisfaction. According to Peter and Lawler, productivity leads to job-satisfaction because performance attracts rewards and if rewards result in job-satisfaction according to equity theory.

  The most realistic approach under system concept is that both job-satisfaction and performance are correlated and influence each other, these two have circular relationship. Performance or productivity leads to rewards and satisfaction which then push the men to more efforts because of high perceived expectance and it further leads to higher performance or productivity which again leads to satisfaction in a circular relationship. Thus, job-satisfaction leads to productivity if effective leadership is provided.

**Advantages of Job-satisfaction study:**

- Knowledge of General level of satisfaction:

  A study of job satisfaction gives the management knowledge of general level of satisfaction among the workers of the company. The study may be made with reference to a particular subject and a particular group of
employee. It tells how employees feel about their job and about the organization, what part of their feelings need attention and whose feelings are involved etc. Such study is a powerful diagnosis instrument for looking at employees problems.

- **All round communication:**
  The flow of communication is in all directions, i.e., upward, downward and lateral because such surveys are planned, taken up and discussed. When we encourage the workers to explain what is in their minds, upward communication may be fruitful.

- **Improved Attitudes:**
  The attitudes of workers are improved through job-satisfaction study. It acts as a safety valve, releases one’s emotions by expressing them during the course of survey. Thus job-satisfaction study to an expression of management interest in employee-welfare which give employees a better feeling towards management.

- **Determining Training Needs:**
  It determines the training needs of employees and supervisors. It can be well established in the course of survey in what areas the employees are dissatisfied or not satisfied. It helps the management to determine whether employees or supervisors need training and in which field so that the management may arrange for the training.

- **Benefits to Unions:**
  Executives and union office bearers discuss about the various wants of the employees. Unions rarely oppose the survey results and in most of the cases support them, especially when they know that they will share the results.
➢ **Conclusion:**

The Diamond industry is one of the fastest growing industry in the country. Diamond industry has lion's share in Indian foreign exchange earner, today, it contributes about 1/5 of the country’s exports. The exports of diamond are concentrated in 13 countries that account for 87% of the diamond exported by India to the world market during 2009-10. In these industries the very need for people to get their income. In India where the cheapest Laborer cost, where the cost of finished diamonds are the cheapest than other countries. So in foreign business we get more benefit and these benefit are used in human resources, so the revolution in the human life style.

This is clearly shows that diamond polishing industry in India is very significant, its massive socio-economic impact on Indian sub-continent.
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