production figures from the government to evade tax. This is compounded by the fact that mining operations are marginal and irregular.

There is sufficient demand for coloured stones (See 2.4.8) to warrant continuous supply. But, the problem of production and supply in the major coloured stone districts in the world is that the concentrations of gemstones are too erratic to make their exploitation economically viable(46). By value, the most important sources of coloured stones are the secondary or alluvial deposits. Normally, the cost of mining of alluvial deposits is relatively low(See III under 2.3.1 and I under 4.2.2). Other sources of coloured stones are from primary deposits, the most important being pegmatite dyke, followed by contact metamorphic deposits and vein deposits.

I. GENERAL DESCRIPTION OF GEMSTONE OCCURRENCES

Unlike the production statistics of the world coloured stones, establishing the relative importance of the major producing areas is not difficult. The most important gemstone localities in the world are:

A. DIAMOND

There are diamond deposits in many parts of the world, most occuring in Africa, Siberia, and recently in Australia. Up to the 18th century most diamonds came from India, though the present production in this country is of little importance. During the 18th and 19th centuries, Brazil led the world in diamond production, then South Africa took over. Presently, Australia is the world's leading producer of diamonds, though most of the diamond from Australia are of industrial quality.

The most significant diamond producer in the developing countries is South Africa. Well known diamond mines in South Africa are Bultfontein, De Beers, Dutoitspan, Finch, Jagersfontein and Wesselton. Other well known producers in the developing countries are; Angola, Zaire, Ghana, Sierra Leone, Central Africa Republic, Namibia, Tanzania, *Guyana, Venezuela and Brazil.*

B. CORUNDUM

(1) Ruby

Important deposits are in Burma, Thailand, Sri-Lanka and Tanzania. The most important source is from upper Burma near Magok. Ruby deposits

in Thailand are found south-east of Bangkok in the district of Chantaburi. In Sri-Lanka, the deposits are situated in the south-west of the island in the district of Ratnapura. The most recent rubies found in Tanzania come from the Umba River (north-west Tanzania).

There are some unimportant ruby deposits in Afganistan, Queensland (Australia), Brazil, Cambodia, Madagascar, Malawi, Pakistan, Zimbabwe, Switzerland(Tessin) and in Montana and North Carolina(U.S.A.).

(2) Sapphire

The economically important Sapphire deposits are in Burma(near Mogok), Sri-Lanka (in the region of Ratnapura), Australia (in New South Wales), and Thailand. There are two sapphire deposits in Thailand. The Bang-Kha-Cha deposit is near Chantaburi(south-east of Bangkok), the other Bo Ploi deposit is near Kanchanaburi(north-west of Bangkok).

The most desired sapphire used to come from India (Kashmir), the deposit has apparently been worked

out(63). There are deposits in Brazil (Mato Grosso), Cambodia(West), Kenya, Malawi, Zimbabwe and recently in Tanzania(north) and Finland (Lapland).

C. *BERYL*

(1) Emerald

The most important deposits are in Colombia (north-west and north-east Bogota). Other important sources are: Zambia(Kafubu Area), Zimbabwe (Sandawana mine in the south), Brazil (Bahia, Goias and Minas Gerais), South Africa (northern Transvaal), Kenya and in the Urals (north of Swerdlowsk).

Other emerald deposits without special economic importance are in Tanzania, India, Pakistan, Australia(New South Wales, Western Australia), U.S.A. (Connecticut, Maine, North Carolina) and in Austria (Salzburg).

(2) Aquamarine

There are aquamarine deposits in all continents. The most important ones are in Brazil (Minas Gerais, Bahia, Esperito Santo). Deposits have also been found in the inner highlands of Madagascar.

The well-known deposits in Russia (in the Urals, and Transbaikalia), seem to be worked out(63).
The following deposits are only of local importance: Australia (New South Wales), Burma, Sri-Lanka, India, Kenya, Mozambique, Zimbabwe, South Africa, Namibia, Tanzania and the U.S.A.(Colorado, Connecticut, Califonia, Maine, North Carolina).

(3) Morganite

Important deposits are in Brazil (Minas Gerais), Madagascar, Mozambique, Zimbabwe, Namibia, and the U.S.A (Califonia).

(4) Goshenite

Found in U.S.A.(Goshen, Massachusetts)

D. CHRYSOBERYL

(1) Alexandrite

Main deposit presently found in Sri-Lanka and Zimbabwe. Other deposits are in Burma, Brazil, Madagascar, Tasmania and in the U.S.A. The deposits in the Urals are worked out (63).

E. SPINEL

(1) Pleonaste

Main deposits are found in Burma(near Mogok) and Sri-Lanka (near Ratnapura). Less important deposits are in Anatolia, Afghanistan, Brazil, Thailand and U.S.A.(New Jersey)

F. TOPAZ

Most important deposits are in Brazil(Minas Gerais, Esperito Santo), Sri-Lanka, Burma and Russia (Urals, Transbaikalia). Other deposits are in Australia, Japan, Madagascar, Mexico, Nigeria, Zimbabwe, Namibia and the U.S.A.

G. GARNET MINERAL GROUP

(1) Pyrope

Main deposits are in South Africa, Australia and Czechoslovakia. Pyrope(rhodolite) deposits are also found in Sri-Lanka, Brazil, Zambia, Tanzania, Kenya, and the U.S.A.(North Carolina).

(2) Almandine

Main deposits are found in Sri-Lanka, India, Afghanistan, Brazil, Austria and Czechoslovakia.

(3) Spessartite

Presently Spessartite is found in Sri-Lanka, Brazil, Madagascar U.S.A. and Sweden.

(4) Grossular

Grossular deposits are in Sri-Lanka, Pakistan, South Africa, Tanzania, U.S.A., Russia and Canada.

(5) Andradite

Andradite (demantoid) deposit is found in the Urals. Andradite (topazolite) deposits are also found in Switzerland(Zermatt) and in the Italian Alps.

(6) Uvarovite

Deposits are in India, Urals, Finland, Poland, U.S.A. and Canada.

H. ZIRCON

Deposits are mostly alluvial and are found in Cambodia, Burma, Thailand, Sri-Lanka, Madagascar, Tanzania, Vietnam, Australia and France (Haute Loire)

J. TOURMALINE

The most important deposits are found in Sri-Lanka, Madagsacar, Brazil (Minas Gerais, Bahia), Mozambique, Angola, Burma, India, Zimbabwe, Namibia, Tanzania, Thailand, Australia, Russia (Ural, Transbaikalia), U.S.A. and Europe.

K. SPODUMENE

(1) Hiddenite

Deposits are found especially in Brazil, Madagascar, Burma and the U.S.A. (North Carolina, Califonia).

(2) Kunzite

Main Kunzite deposits are in Madagascar, Brazil, Burma and U.S.A. (Califonia, Maine).

L. QUARTZ

(1) Rock Crystal and Smoky Quartz

These are found worldwide.

(2) Amethyst

It is the most highly valued stone among the macro-crystalline quartz minerals. The most important deposits are in Brazil, Uruguay, Madagascar, Namibia and recently in Zambia.

(3) Citrine

Natural Citrine is rare. Deposits are in Brazil (Bahia, Goyez, Minas Gerais), Madagsacar, U.S.A. (Pikes Peak, Colorado), Spain (Cordoba, Salamanca), Russia(Mursinska/Ural), France and Scotland.

(4) Rose

Brazil is the largest supplier, though the best quality comes from Madagascar.

(5) Aventurine

Important deposits are in India, Brazil and Russia.

M. CHALCEDONIC QUARTZ

(1) Chalcedony

There is a wide distribution of deposits, especially in Brazil, India, Madagascar and Uruguay.

(2) Carnelian And Sard

The best qualities come from India, though Brazil and Uruguay are major producers.

(3) Heliotrope (Bloodstone) Chrysoprase

The most important deposits are in India, Brazil, China, U.S.A. and Australia.

(4) Agate

The most important agate deposits are in the South of Brazil and the north of Uruguay. There are other deposits in China, India, Madagascar, Mexico and U.S.A. The most important agate deposits at the

beginning of the 19th century were in Germany (near Idar-Oberstein).

N. JADEITE

The most important jadeite deposits are in upper Burma, near Tawmav. Other important deposits are in China, Guatemala, Japan, Mexico and U.S.A.(Califonia).

. NEPHRITE

It is more common than jadeite. It is found in China, (Sinkiang), Burma, Brazil, New Guinea, Australia(Tasmania), Taiwan, Poland, canada, and Mexico. The large deposits in New Zealand (South Island) are not very important on the world market, because exports of raw material have been prohibited.

Q. PERIDOTE AND CHRYSOTILE

The most important deposits are in the Red Sea on the volcanic island. There are important deposits also in Burma(Mogok). Less important deposits are in Brazil(Minas Gerais), South Africa, Zaire, Australia(Queensland) and the U.S.A. (Arizona, Hawaii, New Mexico). In Europe peridote is found in Norway.

R. ZIOSITE

The most important deposits are found in Tanzania(Arusha), South Africa, Western Australia and Norway (near Thule).

S. FELDSPAR MINERAL GROUP

(1) Orthoclase

The most important deposits are found in Madagascar and Upper Burma.

(2) Labradorite

There are deposits in Madagascar, Canada(Ladrador, Newfoundland), Mexico, Russia and U.S.A. Other Labradorite deposits are in Finland and Australia.

(3) Oligoclase

Oligoclase(sunstone, aventurine) feldspar deposits are found in India, U.S.A., Canada, South Norway and Russia.

(4) Microcline

There are important deposits of microcline(amazonite)

feldspar in Sri-Lanka, Burma, Brazil, India,
Madagascar, Tanzania, the U.S.A. and Australia.

T. TURQUOISE

The best qualities are found in Iran(near Nischapur). Other deposits are in Tanzania, Afghanistan, Australia, China(Tibet), Israel(north of Elat) and U.S.A.

U. LAZURITE

(1) Lapis Lazuli

Mineable deposits are rare. For centuries the most important deposits with the best qualities has come from Afghanistan in the West Hindu Kush mountains. Other important deposits are in Chile (Coquimbo Province) and in Russia(Baikal Lake).

V. OPAL

Important deposits of the varieties are in Australia(New South Wales, South Australia and Queensland). Other deposits are found in Brazil, Guatemala, Honduras, Japan and U.S.A. Czechoslovakia used to be the supplier of the best quality Black Opals(63).

W. ORGANIC

(1) Amber

The largest deposit in the world is in Poland (Samland near Palmnicken). There are large reserves also on the seabed of the Baltic. Other less important deposits are found in Burma, Dominician Republic, Sicily, Romania, Canada and some Atlantic states of the U.S.A.

(1) Jet

Much was found in United Kingdom (Whitby, Yorks), but presently comes from Spain (Asturias), France (Dep. Ande) and the U.S.A. (Utah, Colororado).

Table 2-2 also shows the important gem producing countries together with the gems they produce (see also Figure 2-1)

TABLE 2-2: TOPOGRAPHICAL LISTING OF GEMSTONES OCCURRENCES

A. AFRICA

Angola	Diamond
Ghana	Diamond

TABLE 2-2: TOPOGRAPHICAL LISTING OF GEMSTONES OCCURRENCES (CONTINUATION)

Kenya	Pyrope(rhodolite) and grossular(tsavolite) garnet; corundum(sapphire); beryl(emerald); chrysoberyl(alexandrite)
Madagascar	Beryl(morganite); spodumene(kunzite, hiddenite); quartz(amethyst, citrine, rose,); chalcedonic quartz(chalcedony, agate); microcline(amazonite), orthoclase and labradorite feldspar; topaz; tourmaline
Republic of Central Africa	Diamond
South Africa	Diamond; pyrope(rhodolite) garnet
Sierra Leone	Diamond
Namibia	Diamond; tourmaline
Tanzania	Diamond; ziosite(tanzanite); grossular(tsavolite) garnet; corundum(ruby, sapphire);
Zaire	Diamond
Zambia	Beryl(emerald, aquamarine); quartz(amethyst); tourmaline;

TABLE 2-2: TOPOGRAPHICAL LISTING OF GEMSTONES OCCURRENCES. (CONTINUATION)

Zimbabwe	Beryl(emerald, aquamarine); chrysoberyl(alexandrite)

B. ASIA

Burma	Corundum(ruby,sapphire); jadeite; spinel(pleonaste); zircon; peridote; microcline(amazonite) feldspar
Sri-Lanka	Corundum(ruby,sapphire); chrysoberyl(alexandrite); zircon; spinel(pleonaste); pearl; almandine, sperssartite, grossular and pyrope(rhodolite) garnet; microcline(amazonite) feldspar; peridote; tourmaline; topaz
Thailand	Corundum(ruby, sapphire); zircon; spinel(pleonaste)
India	Corundum(sapphire); almandine and uvarovite garnet
Afghanistan	Lazurite(lapiz lazuli)

U.S.S.R.	Beryl(emerald); tourmaline; topaz; andradite(demantoid) garnet; labradorite and oligoclase (sunstone,aventurine) feldspar; diamond; chrysoberyl(alexandrite)
Iran	Turquoise; pearl
Japan	Cultured pearl

C. SOUTH AMERICA

Brazil	Beryl(aquamarine, emerald, morganite); quartz(amethyst, citrine, rose aventurine); topaz; tourmaline; all varieties of chalcedonic quartz; corundum(sapphire); diamond; spodumene(kunzite, hiddenite); chrysoberyl(alexandrite); pyrope(rhodolite), almandine and sperssartite garnet
Venezuela	Diamond; pearl
Colombia	Emerald
Guyana	Diamond

D. EUROPE

United Kingdom	Jet; quartz(citrine)
Germany	Amber

TABLE 2-2: TOPOGRAPHICAL LISTING OF GEMSTONES OCCURRENCES. (CONTINUATION)

Czechoslovakia	Almandine,and pyrope(rhodolite) garnet

E. NORTH AMERICA

U.S.A.	Jadeite; turquoise; grossular, spessartite, uvarovite, and pyrope(rhodolite) garnet; topaz; peridote; beryl(morganite); labradorite, microcline(amazonite), and oligoclase(sunstone, aventurine) feldspar; fresh-water pearl; spodumene(hiddenite, kunzite) quartz(citrine); tourmaline

F. AUSTRALASIA

Australia	Diamond; corundum(sapphire); turquoise; chalcedonic quartz(heliotrope (bloodstone) chrysoprase); opal(fire, black, white)

them. Panning is

FIGURE 2-1 APPROXIMATE SOURCES OF PRINCIPAL GEMSTONES ON CONTINENTAL BASIS

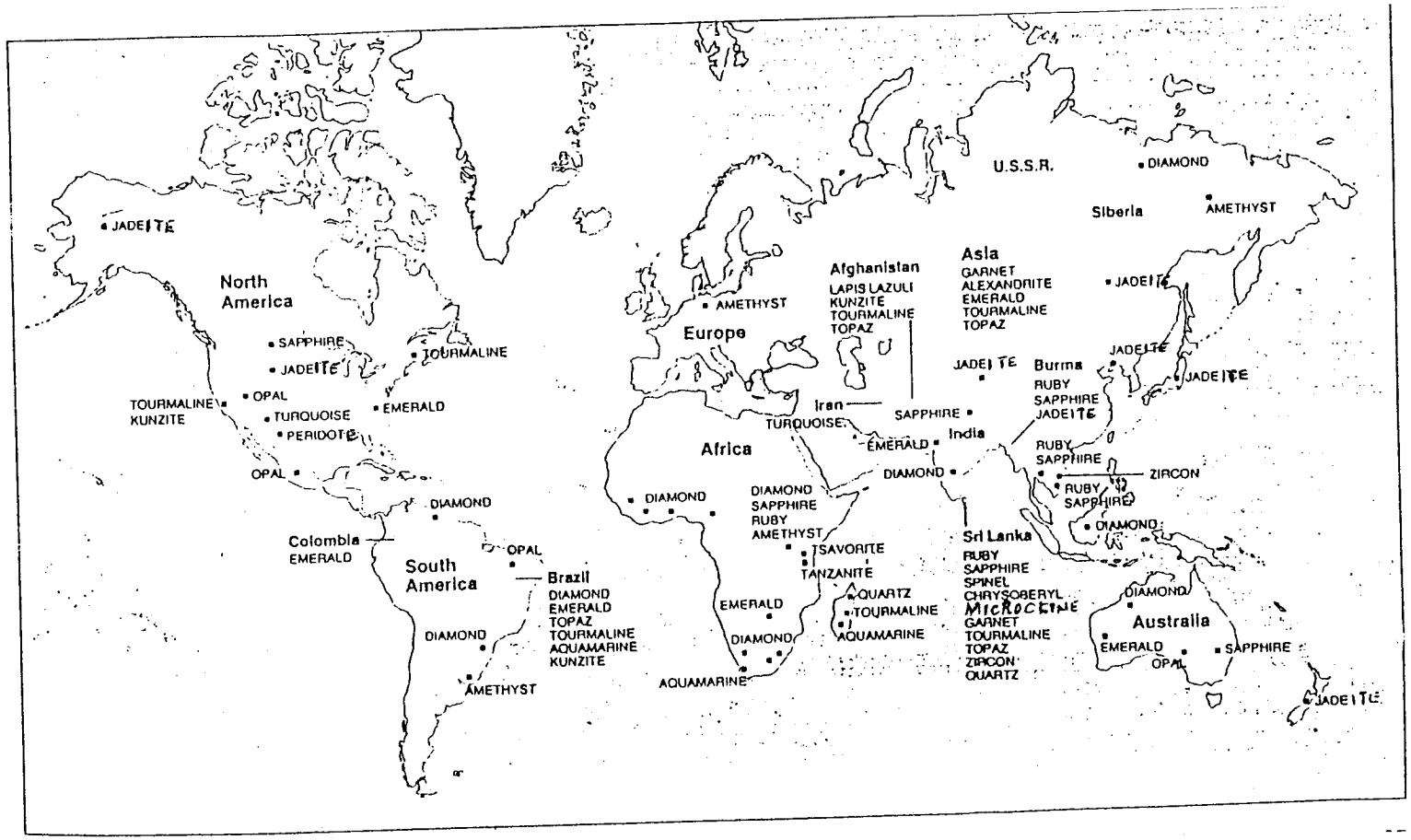
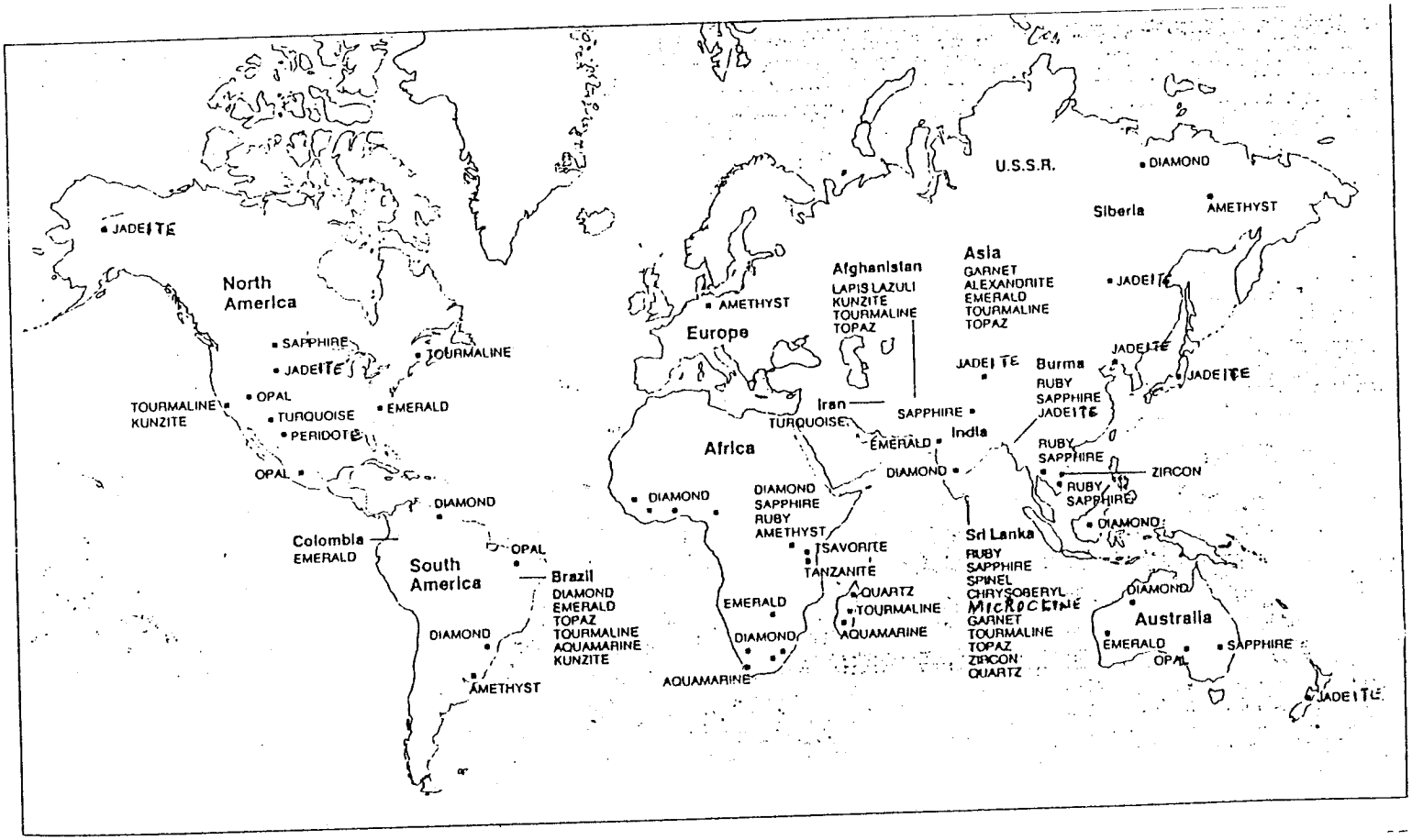


FIGURE 2-1 APPROXIMATE SOURCES OF PRINCIPAL GEMSTONES ON CONTINENTAL BASIS



II. Mining and Processing of Coloured Stones

Coloured stones found in river gravels are usually heavier than the average of the materials making up the gravel. This physical characteristic combined with the chemical inertness of most gemstones is exploited in concentrating them. Panning is therefore used considerably in Burma, Sri-Lanka, India and Thailand to obtain concentrate of the gems from which rough coloured stones are selected by hand picking.

Slightly more advanced methods of mining are sometimes used in certain deposits in a number of the countries just mentioned. In this case, the operation is accomplished by power or hand operated rockers that perform the panning mechanically. In certain occasions streams are dammed and directed through a sluice to effect this purpose. In general, the actual mining of coloured stones from gravel is accomplished by hand methods. However, in a few of the larger alluvial deposits that yield a sufficient number of stones to cover the cost, power shovels and other modern earthmoving machinery are used to achieve greater production and mechanization of the concentration process also helps to increase the yield.

In most developing countries, the mining of hard rock-hosted gem is commonly carried out by the 'lump

hammer and chisel' method. This simply involves the use of available cheap labour and, though much slower, has the advantage of not unduly damaging the sought-after gemstones. Mining of the Hofmeyer gem-tourmaline pegmatite at Nyimba(Zambia), is a typical example. The mining of some pegmatite dykes (in some countries), however, require drilling and blasting in order to find the pockets in which coloured stone crystals are concentrated. In contrast to the mining of diamonds, the danger of breaking coloured stone crystals by blasting is great. Thus, once the pockets are located caution and experience is required to avoid destroying the coloured stones. Simple hand tools are mostly used in collecting the gems from the pockets.

III. Investment and Input Cost in Coloured Stone Production

The investment costs of bringing gemstone deposits(other than diamonds) into production are generally low compared to investment costs in the mining of other minerals. For instance, the bulk of investment capital which enabled Kagem Emerald Mine in Zambia to take off in 1984 was in the range of 5 million United States dollars. It is worth nothing that the Reserved Minerals Corporation, since 1981 had then undertaken minor investment on the same mine. The Kagem Mine is reported to be one of the biggest coloured stone mines in the world(18). In contrast,

Mikessel et al. (2) estimated that the magnitude of copper investment in 1974-1977 for a low capacity production unit required some 200 million United States dollars and 500 million United States dollars was the investment required for a higher capacity production unit. Such large investment costs are not uncommon in most traditional metal mining projects. It is obvious from the relative investment cost analysis that production costs for coloured stone mining are also low. Consequently, the mining of coloured stones can be undertaken even in developing countries with low capital formation rates. This is an essential characteristics of small-scale mining and it is an advantage which developing countries with economically viable gem deposits can exploit.

The processing of coloured stones which involves; cutting, polishing and facetting of coloured stones, on the other hand is a highly professional occupation requiring experienced craftsmen. Technically the processes involved in the cutting, polishing and facetting of coloured stones products are quite simple and stable. Some manufacturers also undertake casting.

To some extent cutting and polishing of coloured stone is performed in both developed and developing countries. However, the location of the main cutting capacity is highly concentrated in few countries. In Europe, the

Federal Republic of Germany is the principal cutting centre, and is also noted for high standards of cutting. The United kingdom, United States, Switzerland, Netherlands and other few developed countries also have limited cutting facilities for coloured stones.

The main cutting countries in developing counties are: Thailand; Hong Kong; India; Brazil; and Sri-Lanka. Bangkok in Thailand is a major cutting centre for all rough stones in Asia. Hong Kong's significance is more as an entre-pot trading centre for stones, though, some re-cutting takes place there. Furthermore, Brazil has more than 300 renowned cutters in Rio de Janeiro(19). As a result of the high cutting standard requirements as well as exacting specifications in facetting, most developed countries' manufacturers would not like to buy cut stones directly from most developing countries except those known to have built expertise.

2.4 Consumption and Marketing of Coloured Stones

Gemstones have interesting but complex demand characteristics. Consumers demand gems for investment purposes, thus the demand can be for the commodities themselves.

Gemstones are also used as inputs in the manufacture of

final consumer and producer goods. The input requirements in this case, make them have, like other metals, a derived demand.

The value of a gemstone affects its demand greatly. The main factors influencing the value and therefore demand of gemstones are; beauty, durability, rarity, size, fashion,tradition and portability(17,20).

2.4.1 Beauty

The fascination felt for gem is mainly a visual appreciation of their beauty. Unless a gem displays beauty or possesses potential beauty that can be revealed by fashioning, it cannot be considered a gemstone. Beauty lies mainly in vivid colouration, perfection in cutting and lustre.

2.4.2 Durability

The ability of gems to resist ordinary wear enough to retain its beauty for a reasonable period is an important requirement. Durability depends upon mineralogical hardness, or the ability to resist abrasion, and upon toughness, or resistance to fracture.

One oustanding characteristics of gems is their chemical

and structural stability. Unlike some metals that oxidize and slowly disintergrate, or some fabrics and woods that discompose, gems would withstand for centuries conditions that quickly destroy most other metals. By definition therefore, all the important gems in the fine quality are limited to the harder minerals. Among the gems however, there exist extreme differences between various gem species in hardness and durability.

2.4.3 Rarity

It is human nature to treasure the rare, sometimes for rarity sake alone. As a result, rarity frequently plays very important role in valuing gemstones. Not only is the lovely green colour of emerald for example, highly cherished, but its great rarity makes demand very high in relation to availability.

Paradoxically, rarity can be a handicap if it goes too far. Unless a gem material is common enough to be known to consumers, too little demand exist for it to achieve sufficient status to bring high prices.

2.4.4 Fashion

The factor of fashion is closely related to those of beauty and rarity. Fashion dictates the use of gems since

what would be considered attractive one period may not be so with time. In our dynamic world, new standards are always emerging, influencing fashion and demand for gems.

2.4.5 Tradition

Tradition as applied to gems, is the sum of all the efforts throughout the centuries to interest and educate the public in the use of gem for ornamentation,symbolism, and as a medium of exchange.

Tradition has established the importance of the principal natural gems and has associated them with genuine achievement in all sphere of life. It is this established value over generations which militates against the use of synthetics and man-made imitations as substitutes for gems.

It is interesting to note that while synthetics and imitations are valued only at production and handling cost, such costs have very little place in valuing natural gems.

2.4.6 Size

The use of the expression the "bigger the better" summarizes this human factor of valuing and demand.

Increasing size of gem in jewellery for example is a symbolic of greater wealth and high position.

2.4.7 Portability

This factor applies to any fine gemstone and is based on the fact that it represents a high concentration of value in a small object. These small high valued gems can more easily be transported and disposed of than bulkier items of equal value. This is what gives gemstones universal security of value and has therefore influenced people to demand gemstones for investment.

Coloured stones like other gemstones are mainly demanded for jewellery and for the "investment market". In addition, increasing quantities are being used by hobbyists, for figurines, boxes, ashtrays, as specimens and for home decoration. They are also used for industrial purposes, as shown below. The type of use of coloured stones depends mainly on the gem's category in value.

2.4.8 SOME INDUSTRIAL USES OF GEMSTONES

Tourmaline is used in the laboratory to demonstrate the polarization of light, as a material to measure the

compressibility of fluids and in gages for measuring high pressures.

Agate is made into mortar and pestle sets, knife edges for balances, textile rollers, and spatulas.

Natural gemstones have been used as jewel bearings in timing devices, gages, meters and many other types of instruments requiring precision elements.

The uses of manufactured crystals include applications in frequency controllers, polarizers, transducers,radiation detectors, infrared optics, bearings, strain gages, amplifiers, lasers, lenses, and crucibles

2.4.9 Coloured Stone Consumption Statistics

As previously discussed the world's consumption statistics for coloured stones are very difficult to come by.
However, Table 2-3 provides a ranking of the major developed countries positions in the world coloured stone market. It is worth noting that coloured stones like other gems are luxury goods and their demand is mainly confined to wealthy people. Trends in the demand of gems are primarily dictated by fashion in the developed countries. Table 2-3 shows that; in 1977, Switzerland was the largest

TABLE 2-3 RANKING OF IMPORTS OF PRECIOUS AND SEMI-PRECIOUS STONES AMONG 18 SELECTED COUNTRIES

Countries	1977 Import Size	1973-1977 Import Growth	1977 Imports from Develop-ing Countries	1973-1977 Growth of developing countries
Switzerland	1	4	3	7
United States	2	7	1	10
Japan	3	18	2	17
United Kingdom	4	15	6	15
Germany, Federal Republic	5	13	4	14
France	6	9	5	13
Austria	7	1	12	12
Canada	8	6	9	6
Belgium-Luxembourg	9	5	11	8
Australia	10	10	7	5
Netherlands	11	2	8	4
Italy	12	17	10	16
Denmark	13	12	16	9
New Zealand	14	16	13	11
Sweden	15	8	14	3
Ireland	16	3	18	18
Finland	17	14	15	2
Norway	18	11	17	1

SOURCE: Import Tabulation System, ITC/UNSC SITC: 667.3

NB. This table covers only coloured stones.

import market for coloured stones. In addition Switzerland had a very dynamic growth over the period 1973 - 1977. United States, Japan, United Kingdom, Federal Republic of Germany and France have large import markets and they received a large portion of their imports from the developing countries in 1977. United States had the largest import from the developing countries in 1977 but her import growth from the developing countries has been relatively small. Despite Japan's large import market size in 1977, she recorded one of the smallest market growth all over the world.

Table 2-4 below also shows the imports of coloured stones to Switzerland from the major supplying countries in the world. The Swiss market is one of the most important coloured stone markets in the world. In the interpretation of any statistics for the Swiss market, it must be borne in mind that these statistics do not necessarily provide an accurate picture. According to a study by the International Trade Centre, many of the dealers confirmed having exported and imported the same stone as many as 15-20 times, hence the statistics may be misleading(21).

Table 2-4 indicates that over the period 1974 to 1978, the coloured stone supply from developing countries have shown a dynamic increase. Their supply increased by 61 per cent

TABLE 2-4 SWITZERLAND: IMPORTS OF PRECIOUS AND SEMI-PRECIOUS*b STONES, 1974-1978

(US $'000)

ORIGIN	1974	1975	1976	1977	1978
TOTAL	99,852.5	117,875.8	104,198.0	154,032.3	184,929.0
Developing Countries total	38,041.5	46,850.4	43,053.2	69,236.7	86,789.0
Panama, excluding Canal Zone	5,299.6	9,910.0	6,540.9	23,231.5	18,541.0
Hong Kong	7,636.2	9,205.3	8,508.3	14,305.1	15,597.0
Thailand	5,758.3	7,191.9	6,830.8	6,778.5	11,194.0
Colombia	3,630.1	6,136.6	4,587.4	6,637.6	7,592.0
Brazil	5,102.3	4,911.3	5,791.1	6,577.4	7,166.0
India	5,325.0	4,534.3	5,058.3	3,757.0	3,716.0
Kenya	644.9	821.0	803.0	2,359.6	1,874.0
Other developing Countries	4,644.8	4,139.7	4,933.1	5,539.7	21,109.0
Developed Countries					
Germany, Federal Republic	16,384.3	17,313.9	16,649.5	20,087.0	20,688.0
France	18,521.9	19,811.8	14,714.3	19,796.4	18,287.0
United Kingdom	10,161.4	14,238.8	10,065.3	15,975.7	21,702.0

SOURCE: Import Tabulation System, ITC/UNSO SITC: 667.3

*b Refers to Coloured Stones

from 1976 to 1977, and a 25 per cent increase from 1977 to 1978. The table also shows the Federal Republic of Germany, France, and United Kingdom as the three major suppliers of coloured stone to the Swiss market among the developed countries.

Furthermore, from Table 2-4 the total share of the developing countries showed a gradual growth from 38 per cent in 1974 to 40 per cent in 1975, 41 per cent in 1976, 45 per cent in 1977 and 47 per cent in 1978. Hong Kong and Thailand are the most important suppliers from the Far East. The two have steadily increased their market share. India's importance on the other hand, has been on the decline. It is worth noting that according to the International Trade Centre study(21), a considerable portion of Indian stones pass through other countries before they are imported into Switzerland. Finally, Panama, which is one of the largest suppliers since 1977, is also a major transit centre for many of the coloured stones from Latin America. Table 2-5 below shows the structure of coloured stones imports to the Swiss market from developing countries over the years 1976-1978. This table shows that among the developing countries, Panama, (excluding Canal Zone), Hong Kong, and Thailand are major suppliers of coloured stones to the swiss market, they have maintained this dominance over most of the time.

Table 2-5: SWITZERLAND: STRUCTURE OF IMPORTS OF PRECIOUS AND SEMI-PRECIOUS STONES*b FROM DEVELOPING COUNTRIES BY VALUE, 1976-1978

(Per Cent)

ORIGIN	1976	1977	1978
Total Imports from developing Countries	100	100	100
Panama, excluding Canal Zone	15	34	21
Hong Kong	20	21	18
Thailand	16	10	13
Colombia	11	10	9
Brazil	13	10	8
India	12	5	4
Kenya	2	3	2
Other Developing Countries	11	8	25

SOURCE: Import Tabulation, ITC/UNSO

*b Refers to Coloured Stones

The imports from Brazil and India have however been declining. As explained previously, a considerable portion of India's stones pass through other countries before they are imported to Switzerland.

The study by International Trade Centre(21) describes Switzerland as major "transit" market for coloured stones coming from other European markets as well as from the United States and the Far-East. The major reasons why Switzerland is the main world trade centre for gemstones are:

(1) Security and stability of the Swiss economy and the Swiss franc.
(2) The conducive Swiss business climate.
(3) Confidentiality in financial dealings.

Geneva and Zurich are the main trading centres. Customs and tariff barriers are reasonably low and registered importers do not pay any turnover tax on their stone imports(21). Foreigners or non-registered importers on the other hand, must pay 8.4 per cent turnover tax on the value of their mechandise.

Coloured stones play very important role as an "Investment market" in Switzerland. There are several Swiss financial

institutions who have gemmologists on their staff or work closely with certain dealers. It has been estimated that "Investment sales" could amount to 20 per cent of the trade in the next couple of years(21). According to the ITC study (21), due to the increasing price levels for diamonds, demand for coloured stones especially rubies, sapphires and emeralds are likely to rise. It is worth noting, however, that uncut stones have limited potential on the Swiss market. This is mainly because it is not a cutting centre and about 90 per cent of stones imported to Switzerland's market has to be cut.

Tables 2-6 and 2-7 also give the statistics of imports of coloured stones into the United Kingdom. The Tables seek to show further the market share of the developed and developing countries. The maximum uncut stone to United Kingdom market (22) over the period in the Tables was 20 per cent in 1977. It may be seen from Table 2-6 that, in 1977 the developing countries accounted for 27 per cent of total exports of coloured stones by value into the United Kingdom. They supplied 33 per cent in 1973 but only 21 per cent in 1976. Among the developing countries, Thailand and Hong Kong are most important exporters to the United Kingdom, both countries accounting for 15 per cent of all imports in 1978 (Table 2-7). The Federal Republic of Germany is the most important source of coloured stones

TABLE 2-6 IMPORTS OF PRECIOUS AND SEMI-PRECIOUS STONES*b

INTO THE UNITED KINGDOM BY ORIGIN, 1974 - 1978

(£' 000)

ORIGIN	1974	1975	1976	1977	1978
TOTAL:	26,569	36,216	36,876	39,761	38,135
of which from					
Developing Countries					
Thailand	2,335	2,853	2,501	3,001	3,136
Hong Kong	2,859	2,857	2,014	2,976	2,779
India	625	960	917	1,128	1,468
Brazil	1,161	1,192	950	840	497
Zambia	..a/..	--	--	727	595
Colombia	9	32	164	643	73
Morocco	--	157	295	416	--
Sri-Lanka	--	135	312	251	137
Developed Countries					
Switzerland	7,592	12,974	13,265	13,549	14,866
Federal Republic of Germany	3,544	4,772	6,750	3,918	3,398

SOURCE: Overseas Trade Statistics of the United Kingdom, STC Code 667.3

..a/.. = negligible, *b Refers to Coloured stones

into United Kingdom that are cut to a high standard. It accounted for 9 per cent of United Kingdom's total imports in 1978 (Table 2-7).

TABLE 2-7: IMPORTS OF PRECIOUS AND SEMI-PRECIOUS STONES[b] INTO THE UNITED KINGDOM BY ORIGIN IN TERMS OF VALUE, 1974-1978(SHARES FOR MAIN SUPPLIERS)

(Per Cent)

ORIGIN	1974	1975	1976	1977	1978
Switzerland	29	36	36	34	39
West Germany	13	13	18	10	9
Thailand	9	8	7	8	8
Hong Kong	11	8	5	7	7
India	2	3	2	3	4
Brazil	4	3	3	2	1
Zambia	-	-	-	2	2

SOURCE: Compiled from Table 2-6

b Refers to Coloured Stones

Table 2-7 also shows that imports of the United Kingdom from Hong Kong and Brazil have become relatively less important, while imports from Switzerland and Zambia(mainly uncut emeralds) have become more important. According to the International Trade Centre, Switzerland's position as a major supplier of cut stones to the United Kingdom is due almost entirely to "investment stone trade", (22). From Table 2-7 Switzerland's substantial market share has been steady over the years.

Table 2-8 further shows that the United Kingdom's market for coloured stones has a close link with the jewellery products. Table 2-8 shows that sales of precious jewellery incorporating coloured stones rose by 73 per cent compared to 69 per cent increase for the sales of other precious jewellery over 1974-1977. It should be borne in mind however, that a high percentage of stones are re-exported on the United Kingdom market.

Finally, Table 2-9 shows the total imports of United Kingdom giving the breakdown of categories of products for 1974-1978 period. From the Table, since 1975, unworked stones (uncut stones) have accounted for between 10-15 per cent of total imports by value. Although no detailed breakdown has been available since 1976, the study by the International Trade Centre (22) gives a highly probable indication that amongst the unworked stones imported to

TABLE 2-8 SALES OF JEWELLERY BY UNITED KINGDOM MANUFACTURERS, 1974 - 1977[a]

PRODUCT	1974	1975	1976	1977	No of enterprises
Precious jewellery and goldsmiths' wares of precious metals other than silver and silver gilt					
- incorporating precious or semi-precious*b stones	25,577	28,976	36,414	44,204	103
- Other	41,410	45,311	49,840	69,784	117
Diamonds, pearls and precious and semi-precious stones, cut or otherwise worked	5,600	4,204	6,530	7,283	10
Other jewellery	60,528	76,884	89,890	112,617	-
Total jewellery	113,115	155,375	182,674	233,888	-

SOURCE: Business Statistics Office, Business Monitor PQ 396.2

*b Refer to Coloured Stones

a/ Establishments employing 11 or more persons (these are estimated to account for 78% of the employment of all establishments)

TABLE 2-9 IMPORTS OF PRECIOUS AND SEMI-PRECIOUS*b, NOT SET OR STRUNG, INTO THE UNITED KINGDOM BY TYPE OF PRODUCT, 1974-1978

(£' 000)

PRODUCT	1974	1975	1976	1977	1978
Unworked					
- Rubies, Sapphires and emeralds	5,254	2,748	3,813	4,362	5,640
- Other	1,345	1,062	1,092		
Other					
- For industrial purposes					
- Articles of piezo-electric quartz	33	39	20	73	34
- Other precious and semi-precious stones					
- rubies, sapphires and emeralds	344	8	8	2	5
- Other	54	7	4		
- For other purposes					
- Rubies, sapphires and emeralds	15,876	28,532	27,854	35,324	32,456
- Other	3,663	3,820	4,058		

SOURCE: Overseas Trade Statistics of the United Kingdom; Monograph of trade channels; ITC/TD/SMR/60 (39), August 1979

*b Refers to Coloured Stones

the United Kingdom, a high percentage consists of rubies, sapphires and emeralds. This also holds for imports of worked stones. From Table 2-9, in 1976 rubies, sapphires and emeralds accounted for 87 per cent of all imports of worked stones for non-industrial purposes. Besides the reflection of their greater unit value, they also constitute an important part of the trade in volume terms.

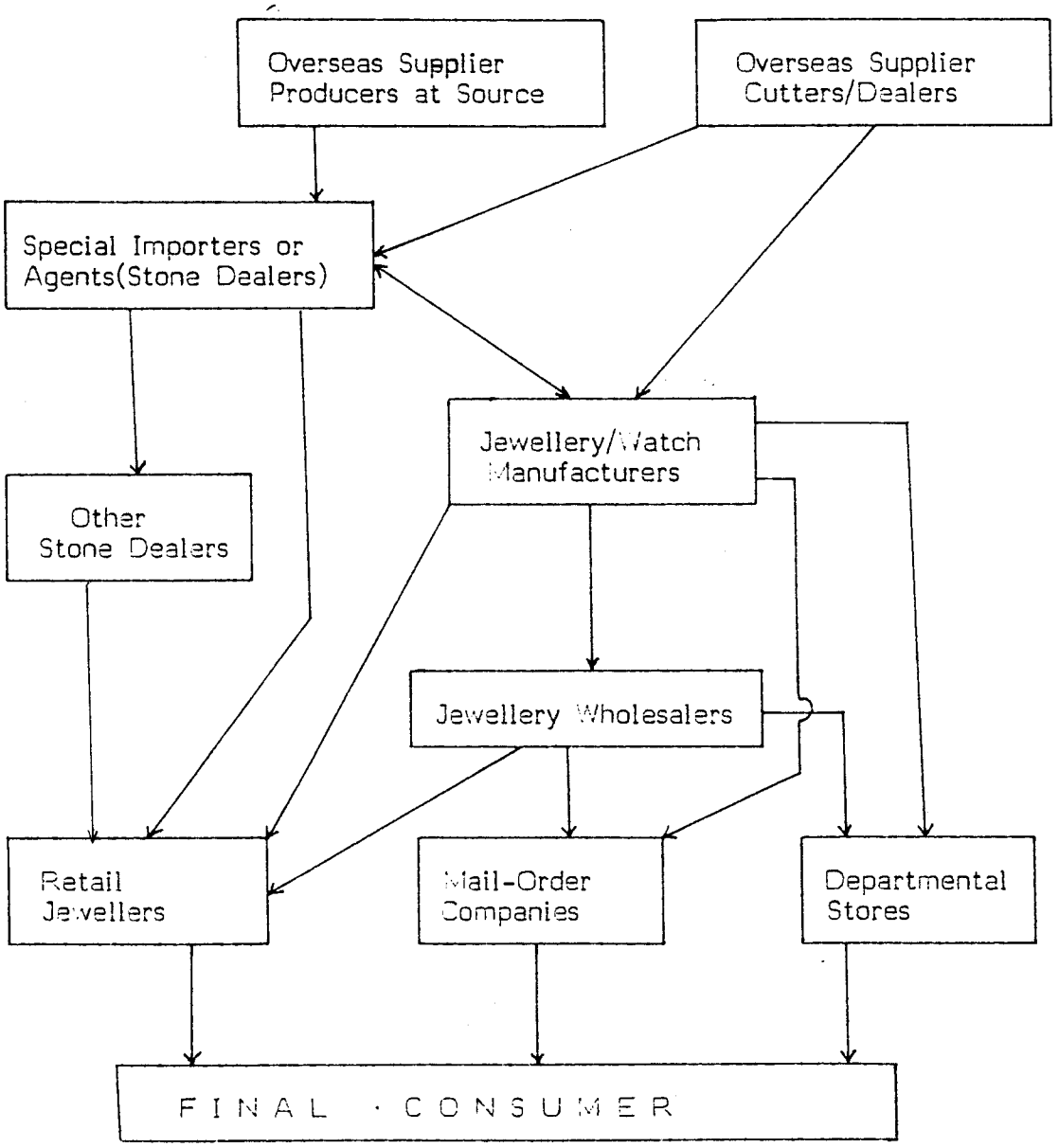
It is worth noting however that there is no import duty payment requirements for imports of coloured stones to the United Kingdom.

2.5 Coloured Stone Trade And Trade Channels

The world trade of coloured stone takes place mainly at the cut stage. At this particular stage a large proportion of the world stone exports end up in the developed countries. This trade pattern confirms coloured stones as luxury goods mainly demanded by wealthy countries. At the uncut stage however, trade takes place mostly between mine producers (mainly in developing countries) and stone dealers from the developed countries.

Figure 2-2 shows a typical trade channel for the distribution of coloured stones in developed countries. From Figure 2-2, as a practice stone dealers buy their stones either from the producing or supplying countries. In most developed countries about 75 per cent of all cut stone imported pass through stone dealers (22). They provide the service of maintaining stocks and also secure certificates for stones when required. Some stone dealers re-cut and polish coloured stones. Stone dealers sell to manufacturers of jewellery and watches, to retailers, and other dealers. However, there are some stone brokers who work on a Commission basis but maintain no stocks.

FIGURE 2-2 A TYPICAL TRADE CHANNEL FOR THE DISTRIBUTION OF COLOURED STONES IN DEVELOPED COUNTRIES



2.5.1 Jewellery Manufactures

Jewellery manufacturers in developed countries are essentially small family companies. The industry is extremely fragmented and specialised.

Most manufacturers obtain their supplies of coloured stones from specialized stone dealers domestically or abroad. Few large firms obtain some of their coloured stone requirements directly from overseas cutters.

2.5.2 Mail-Order Companies

Mail-order plays an important retailing role in most European countries. The mail-order companies buy finished products either directly from jewellery manufacturers or from jewellery dealers. They cater for the lower end of the market.

2.5.3 Retailers

The retail trade is much more fragmented and is small and family oriented. The very few large firms among them are highly integrated, buying their coloured stone straight from producers. These large firms then embark on down stream processing up to retailing. Many retail outlets in developed countries have limited facilities and purchase

their collections direct from the manufacturers or through wholesalers.

2.6 The Market Structure of Coloured Stones

The world coloured stone market can be characterised as follows:-

(1) Coloured stones are traded mostly at the cut stage.

(2) There is high risk in the trade and the trade is also secretive in nature.

(3) There is strong mutual confidence and protectiveness amongst specialized stone dealers domestically and internationally. Stone dealers are mostly in developed countries, and there is a considerable inter-trading amongst them. In brief, there is a world-wide ramification of gem marketing, which requires experience, trust and confidence.

(4) Coloured stone deposits are mostly found in developing countries, but most jewellery manufacturing is undertaken in developed countries.

(5) Coloured stone cutting is limited to a few countries probably due to high cutting standard requirements.

(6) Operation at all levels is small-scale in nature.

(7) Competition is very keen as regards quality, reliability of suppliers and conditions of delivery.

2.6.1 Organization and Concentration of the Coloured Stone Market

Geographically, coloured stone deposits are confined to few countries. Nevertheless, producers of rough stones compete for demand markets. The stone dealers who buy the rough stones from these producers exhibit some monopsonistic characteristics. These stone dealers are very closed selective groups. They are all small family companies that have been in business for generations and have established their own supply lines over the years. They travel to supply centres to buy their requirements of rough stones. Several of these stone dealers resist approach from other producers alleging that their (the stone dealer's) supply lines are already quite adequate for their needs. Nevertheless, in most developed countries it is reported that at least 75 per cent of stones imported pass through these stone dealers (22).

Most coloured stone exchange is on spot or on short-term contracts. Trade takes place also at auctions and at international trade fairs. Payment terms vary considerably. However, due to the slow paying nature of the jewellery trade, dealers seek to get credit from overseas suppliers.

Pricing of coloured stones on the international market is

very complicated as well as monopolistic. This is due to the very complex structure of the coloured stone industry. In most cases the retail prices bear little or no relationship to the cost of production or scarcity value. The price is normally set by agencies and dealers who embark on extensive publicity campaign to popularise and set a fashion trend for a particular stone. This enables them to set up an artificial price. They then feed supplies to the market at a rate which they wish to maintain. To perpetuate this position, the relationship between agents and dealers is very complicated, and it is reported that the highest figure in marketing expense is Agents Commission, which is above 13 per cent of turnover (23)

CHAPTER 3

3. GEMSTONES: DIAMONDS

3.0 Introduction

Diamond's name comes from the Greek adamas/adamantos meaning "unconquerable". It is a crystalline mineral and is composed purely of carbon. Diamond is the only gem composed of just one element and is the hardest substance known. In addition, diamonds are among the most transparent, brilliant and fiery of all materials, they are cherished and highly demanded above all gems.

Only about 20 per cent of all diamonds mined are worth cutting into gemstones, the rest are too flawed, poorly formed or ugly(24). Thus a greater proportion of diamonds are of industrial grade.

3.1 Evaluation of Diamonds

The value of diamond is established by four main basic elements: colour, clarity, cut and carat weight. Diamonds can be graded on the basis of (24,25,48).

(1) Colour

River (best quality)	-	Colourless, very clean white or bluish white
Top Wesselton	-	white
Top crystal	-	faintly tinted white
Crystal	-	tinted white
Top Cape	-	clearly tinted, 1
Cape	-	clearly tinted, 2
Light Yellow		
Yellow (lowest quality)		

(2) Degree of clarity

This takes into account the amount of inclusions that can be seen by an experienced diamond evaluator.

(a) By using a 10x pocket-lense:

Internally flawless(IF)

Very very small inclusions(VVS)

Very small inclusions(VS)

Small inclusions(SI)

(b) With the naked eye:

1st pique ;inclusions hardly visible(P1)

2nd pique ;inclusions clearly visible(P2)

3rd pique ;inclusions clearly visible(P3)

(3) Size or Weight

This considers the stone in carats, as follows:

1 carat(ct.) includes all stones that weight between 0.95 and 1.05 carat(1 carat is equivalent to 200 mg)

3/4 ct. = 0.70 - 0.79 carat

1/2 ct. = 0.47 - 0.57 carat

1/4 ct. = 0.23 - 0.26 carat

Mele' = 0.06 - 0.14 carat

5 point = 0.05 carat

1 point = 0.01 carat

Accordingly, the value and price of diamond are determined by the three factors stated above. In the case of fashioned diamonds the cut or proportions should also be considered.

3.2 Diamond: Market Conditions

3.2.1 Resources

I. Diamond Deposits

There are five main groups of diamond deposits:

(1) Kimberlite pipes;

(2) Kimberlite dykes and fissures;

(3) Alluvial deposits in existing or ancient river courses;

(4) Alluvial coastal deposits; and

(5) Deposits occuring in sedimentary rocks.

(a) Kimberlite Pipes

Kimberlite pipes are the major source of diamonds. The filling of the pipes is kimberlite, a porphyritic ultrabasic rock containing olivine, phlogopite, pyrope and and ilmenite. Diamonds are a primary constituent of kimberlite. The world major diamond bearing kimberlite pipes with their approximate sizes are shown in Table 3-1. Other well known smaller kimberlite pipes are De Beers, Du Toitspan, Wesselton, Bultfontein as well as Koffiefontein and Jagersfontein in the Orange Free State.

These kimberlite pipes vary considerably in in grade. For instance, the grade of the Orapa pipe in Botswana and Finsch mine in South Africa is about 67 carats per 100 tonnes. The Mwadui pipe also has a grade of about 20 carats per 100 tonnes. The South African pipes vary from

5 to 20 carats per 100 tonnes. The Letseng-la-Terai has the lowest grade of 3.34 carats per 100 tonnes,

TABLE 3-1: THE WORLD MAJOR DIAMOND BEARING KIMBERLITE PIPES WITH THEIR APPROXIMATE SIZES

PIPE	COUNTRY	SIZE (SQ. KM)
Mwadui	Tanzania	1.46
Orapa	Botswana	1.06
Coroca	Angola	0.66
Jwaneng	Botswana	0.44
Premier	South Africa	0.32
Zarnitsa	U.S.S.R.	0.21
Finsch	South Africa	0.21
Kao	Lesotho	0.19
Letseng-la-Terai	Lesotho	0.15
Aki	Australia	75.00[a]

SOURCE: AGID Guide to Mineral Resource Development, 1983

a: indicates Reserves of 75 million tonnes at average yield of 6.7 carat/tonne.

however, large stones are found there. Production at the Latseng-la-Terai ceased in 1982 when the operation was reported to be uneconomic(26,27). Diamonds from this source vary from white, yellow, brown, pink, green, blue, grey and black.

(b) Kimberlite Dykes and Fissures

These deposits are closely related to kimberlite pipes, though the kimberlite filling in this case is usually of the micaceous variety. They are the deposits worked by a number of smaller companies in South Africa. These deposits are also very common in Lesotho, however, most of them are barren. Narrow zones of fissures are found in Sierra Leone. Many kimberlite dykes are also found in western Liberia but they are uneconomic.

(c) Alluvial Deposits in Existing or Ancient River Courses

There are extensive alluvial deposits of diamonds in almost all important diamond producing countries. There are several types:

(1) Present river channel gravels; in this diamonds are found in depressions of river beds and

between large boulders.

(2) River flat gravels; in this diamondiferous gravels occur along the banks of rivers and tributaries.

(3) Low terrace gravels; which are older gravels and products of earlier flood plains.

(4) Hill terrace gravels; these are found above flood plain levels.

(5) Swamp gravels; where swamps cut through high terrace deposits with diamonds being redeposited in them.

In Sierra Leone the main alluvial working are in the Kano area near Yengema, and in Tonga area near Pauguma. Alluvial diamond digging is taking place adjourning these areas and along the Sewa River for a distance of over 160 kilometres.

In Liberia the alluvial diamonds occur mainly in present river channels of the Lofa River and its tributaries, and along the Mano River. Alluvial diamond digging is also extensive in the Central African Republic.

Workable deposits lie near Bria, Dar Cholla, north-east of Bria, and in the head waters of the Sanga River.

In Ghana the main diamond fields occur along the Birim River and its tributaries for a distance of about 64 kilometres. There is also a smaller diamond field near Tarkwa 130 kilometres to the south-west of Akwatia.

The diamond deposits near the town of Tshikapa in Southern Zaire are distributed along the Kasai River and its tributaries in gravels underlying semi-consolidated sands. This field extends into Angola where diamond mining and digging have taken place. In the eastern region of Zaire alluvial diamond occur in the Bushamaie, Lubi and the Luilu Catchment areas.

In South Africa alluvial diamonds occur along the Vaal, Harts and Orange Rivers. Extensive alluvial deposits are in addition found in the Lichtenburg District of the Northern Transvaal. Diamond bearing river gravels occur in terraces along the Buffels River in Namaqualand.

Alluvial Coastal deposits are also found in Namaqualand in South Africa and in Namibia.

(d) Deposits in Sedimentary Rocks

Diamonds have been found in the gold bearing conglomerates of the Witwatersrand in South Africa. This deposit is of a detrital origin and indicates a pre-Witwatersrand source for the gems. In addition, diamonds have been found to occur in conglomerates, and graphite schists in Liberia, Central African Republic and in Zaire.

The diamonds of Venezuela and Brazil are thought to have weathered from Pre-Cambrian conglomerate as none of the indicating kimberlite minerals such as picroilmenite and pyrope garnet occur. In addition, diamonds are known to occur in the Tarkwaian near Ashanti, in Ghana.

3.2.2 Production

Diamonds are produced in commercial quantities only in South America, Africa, Russia and recently in Australia. Over 80 per cent of all gem quality diamonds produced in the world come from Africa (24).

Alluvial deposits have been the main source of diamonds in most diamond producing countries. The deposits are

usually non-consolidated and easy to mine.

I. Mining

Diamond digging is very common in West Africa, Venezuela and Sierra Leone. In these countries one or more of the following digging methods are used.

(1) Panning method
(2) diving machines
(3) Coffer dams and stream diverting methods, and
(4) pitting of river banks and swamps.

In most cases the washing and concentrating of the gravels are done by head pans with nail holes. The washed gravels are later jigged manually or mechanically. Finally the concentrate is screened and sorted.

In South Africa the shallow alluvial deposits are mined by first stripping off the overburden. The gravel is then excavated by means of small winch driven cranes. There has been some underground workings of some deep deposits near the Vaal. The mining methods applied are the pillar and stall methods.

Despite the small-scale mining operations, in a few of the

larger alluvial deposits, highly mechanized mining and beneficiation methods employing large scale bucket excavators, draglines, etc. have proved economically viable. Examples of such large-scale alluvial operations include; the National Diamond and Mining Company (DOMINCO), in Sierra Leone, Ghana Consolidated Diamonds Co. Ltd., the Suction Dredge Mining in Venezuela, the Diamond Bucket dredge on the Jequitinhonha River in Brazil, and the CDM operation in Namibia. Many kimberlite pipes including Orapa, Mwadui, Letseng, Finsch, and Aki are mined by conventional open pit methods. The Kimberley group of mines are now all underground mines.

The operations in small diamond mines rarely require heavy initial investment. For instance, there are many alluvial operations in Africa that can be mined economically only by using inexpensive labour. In addition, the operating cost for such operations are relatively low. Small-scale operation can therefore, be profitable in such cases.

On the other hand, many large scale diamond mining operations may require similar high initial capital common with most metal mining operations. For instance, the investment capital which brought the Botswana Jwaneng mine into production in 1982 was 260 million Pula (26).

II. Processing or Refinement(Cutting)

Diamond cutting is a highly specialised form of a lapidary work using accurate equipment and skill of the cutters to achieve satisfactory final results. Technologically, the process of cutting diamonds is relatively simple and stable, although experience is required. Diamond cutting is concentrated in few countries in the world where the necessary professional workmen, equipment suppliers, and suitable rough diamonds are readily available. Major diamond cutting and polishing countries are; Belgium (Antwerp),Israel, United States and India. In addition, there are 20 smaller cutting countries in operation elsewhere in the world. They include; Indonesia, Tunisia, France, Holland, the Federal Republic of Germany, Hong Kong, Thailand, Sri-Lanka, Japan, Brazil, Malaysia, U.S.S.R., China, Taiwan, South Africa, Puerto Rico, Portugal, Philipines, Australia, Tanzania, Haiti, Dominican Republic, Mauritius, Malta, South Korea and United Kingdom (28).

Table 3-2 shows the exports of polished diamonds by value over the period 1970 - 1972. Table 3-3 further shows these exports in percentages over the same period. These tables indicate the main diamond cutting centres who export these polished products after cutting. Belgium was the most important diamond cutting centre over the period,

TABLE 3-2: WESTERN WORLD EXPORTS OF POLISHED DIAMONDS 1970-1972

(Million US Dollars)

COUNTRY	1970	1971	1972
Belgium	292	321	414
Israel	202	265	386
U.S.A.	120	135	177.2
Hong Kong	86	85	110
South Africa	81	78	N/A
India	37	52	N/A
Germany	9	13	9
France	8	10	N/A
TOTAL	835	959	1096.2

SOURCE: Mining Annual Review, 1973

Notes:

N/A Not Available

TABLE 3-3: WESTERN WORLD EXPORTS OF POLISHED DIAMONDS 1970-1972

(Per Cent)

COUNTRY	1970	1971	1972[b]
Belgium	34.9	33.4	37.8
Israel	24.2	27.6	35.2
U.S.A.	14.4	14.1	16.2
Hong Kong	10.3	8.9	10.0
South Africa	9.7	8.1	N/A
India	4.4	5.4	N/A
Germany	1.0	1.4	0.8
France	1.0	1.0	N/A
TOTAL	100.0	100.0	100.0

SOURCE: Calculated from Table 3-2

Notes:

N/A Not Available

b Percentage of exports available

and her exports were always over 33 per cent of the world total. The tables further show that Israel, United States, India, and Hong Kong were among the major cutting and exporting countries over the period.

India specializes in processing the smaller less expensive categories of rough diamonds. Operation in India is labour intensive, as of 1986 India was employing 400,000 cutters and polishers of diamonds. The total diamond exports for India in 1986 was 1,250 million United State dollars, and ranked among the top five export earners of the country(28). Israel who employs 12,000 diamond cutters and polishers, earned in 1986 more than 1,500 million United States dollars in diamond export. The diamond industry is one of Israel's top export earners(28).

Belgium remains the single most important centre for cutting, polishing and trading of rough and polished diamonds over the world. This is mainly due to Belgium's long association with the diamond industry, in addition to the country's huge reservoir of highly skilled diamond workers. The annual value of its official exports is around 3.4 billion United states dollars. The unofficial value is estimated to be 5 billion United States dollars(28).

III. World Natural Rough Diamond Production Analysis, 1969 - 1986

Table 3-4 shows the world production of natural diamonds over the period 1969 to 1986. Figure 3-1 however, is a graphical representation showing the trend of this production over the same period. Table 3-5 indicates Africa's percentage share of the world natural diamonds production over the same period. From Tables 3-4 and 3-5, Africa supplied more than 76 per cent in 1969 and at least 71 per cent throughout 1970 to 1982. Over the period 1969-1982, the only major supplier of natural diamonds from the developed country was U.S.S.R. The world natural diamond production however remained almost static over the period 1969 - 1982.

Although Africa's production increased after 1982, its share of the world's natural diamond production has fallen drastically. Africa's relative diminishing share since 1982 is mainly due to Australia's large natural diamond production since 1983. Australia's natural diamond production has been dramatic since her initial commercial supply in 1983. Australia accounted for 11 per cent of the World's supply in 1983. By 1986 Australia was the largest natural diamond producing country, accounting for 33 per cent of the world's production. By value Australia's output is 10 per cent industrial diamonds,

TABLE 3-4: WORLD NATURAL DIAMOND PRODUCTION 1969-1986
(MILLION METRIC CARATS)

ORIGIN	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total	46.9	49.0	48.6	49.7	49.8	50.4	48.16	46.87	47.85	47.30
Major African Producers Total	35.7	36.0	35.8	37.0	36.9	37.5	35.06	33.67	34.45	33.9
Zaire	17.2	17.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
South Africa	7.9	7.2	7.5	7.7	7.8	8.0	7.8	7.3	7.9	8.0
Ghana	2.4	2.5	2.6	2.5	2.3	2.4	2.27	2.22	2.25	1.5
Angola	2.0	2.4	2.4	2.2	2.2	2.2	0.5	0.4	0.5	0.65
Sierra Leone	2.0	2.0	1.9	1.8	1.7	1.7	1.48	1.1	0.75	0.8
S.W. Africa (Namibia)	1.8	1.9	1.6	1.6	1.6	1.6	1.74	1.69	2.0	1.9
Botswana	-	0.5	0.8	2.4	2.4	2.7	2.37	2.36	2.66	2.8
Tanzania	0.8	0.7	0.8	0.6	0.6	0.6	0.6	0.5	0.4	0.35
Liberia	0.9	0.6	0.5	0.5	0.6	0.6	0.6	0.5	0.5	0.5
Central African Republic	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3