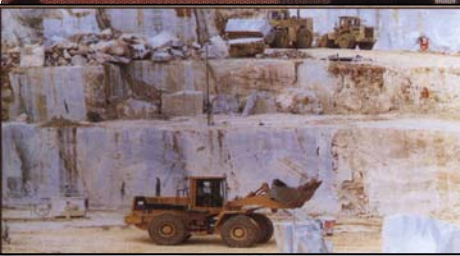


# MARBLE AND GRANITE SECTOR DEVELOPMENT PLAN



Compiled by



Small & Medium Enterprise Development  
Authority (SMEDA)

## **FOREWARD**

*This report draws heavily from experience of local and foreign entrepreneurs in this and allied fields in addition to data and back up information from secondary sources. Wherever needed the data and information has been cross- checked from various sources including governmental and private sector.*

*Selection and synthesis of data and the build up of the arguments, throughout the presentation, reflect the critical approach of the team setting out to discover the opportunity in the environment.*

*Simultaneously, recommendations draw their credibility from having been developed upon the existing capability and marketability potentials of existing and new comers in the field.*

*SMEDA's Marble and Granite sector team acknowledges the contribution of all those who spent their valuable time in deliberating upon the issues including the following.*

- *Industry Experts forming six expert groups under different convenors.*
- *Representative of miners and processing industries along with their zonal organisations.*
- *Govt officials from various concerned provincial departments.*
- *Various officers of Export promotion bureau.*

*Finally we must thank providence for showing us the way and giving us the courage to tread that path.*

## ABBREVIATIONS

<b>DIMD</b>	Directorate of Industry and Mineral Development
<b>DTTMP</b>	Directorate of Technical Training & Manpower
<b>EPB</b>	Export Promotion Bureau
<b>FBS</b>	Federal Bureau of Statistics
<b>IMMM</b>	International Marble Machinery Manufacturer
<b>M&amp;G</b>	Marble and Granite
<b>M/L</b>	Mining License
<b>P/L</b>	Prospecting License
<b>PSIC</b>	Punjab Small Industries Corporation
<b>SDA</b>	Sarhad Development Authority
<b>SIDB</b>	Small Industries Development Board
<b>SMEDA</b>	Small and Medium Enterprise Development Authority
<b>SSIC</b>	Sindh Small Industries Corporation
<b>WSR</b>	World Stone Report
<b>SBP</b>	State Bank of Pakistan
<b>BMR</b>	Balancing Modernization Replacement

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## EXECUTIVE SUMMARY

This study on marble and granite sector starts with an introduction of various types of dimensional stones along with their characteristics and common usage. The study has an international perspective, providing information on mining, production, processing, technologies and marketing practices. International best practices and benchmarks have been discussed. Study profiles, entire spectrum of local marble and granite activities ranging from the availability and location of deposits to their mining, processing, trading and exports have been discussed in detail. Based upon the analysis of data and information, recommendations have been developed for marble and granite sector covering marketing, technology, human resource, financial, institutional and regulatory issues.

### **World Stone Industry**

While stone has been carved and crafted for many centuries, the last 30 years have seen manifold increase with number of key players showing very strong mining and processing presence in the international market due to their technological, marketing and or institutional approaches.

### **World Production, Consumption and Exchange**

Technological changes in the last seventy years have increased the world production and consumption of dimensional stone to 49.5 million tons in 1997. There are over 40 producing countries, while 12 largest producing countries of the world including 6 from Europe and same number from Asia and Africa play key role in the industry.

Dimensional stone processing is being done with different levels of technology in different countries but a few leading countries including Italy, China, Spain, Japan, Taiwan, Portugal, Germany, France, USA, and Greece have developed highly efficient technology for same with good forward and backward linkages. India has also improved this sector considerably in the last two decades. Consumption on the other hand is more wide spread phenomena with over 50 countries of the world making use of dimensional stone in considerable quantities.

World Exchange has gradually grown to around 35% of the world productions in the last few years as it stands today at 18.4 Million tons. Italy, China and India being the major exporters while Japan, Taiwan and Italy (raw marble and granite) being the leading importers.

### **Pakistan Dimensional Stone Industry**

A review of the current state of industry reflects lack of development on scientific lines including technology and human resources.



## **Leases & Reserves**

Current data on leases in different regions reflect that there are 491 prospecting & mining leases for marble & granite. Known reserves in the country are 168 million tons of marble and 414 million tons of Granite. Actual reserves could be manifold.

## **Production and Processing**

Production has grown substantially at 18% in the last twenty years with total standing at 1,337,000 tons in 1997-98. It has been accompanied with high quarry wastage ranging from 61 to 73% in addition to poor quality, mainly due to unwieldy blasting techniques.

Processing industry is using wide array of technological options for basic as well as finishing stage, all of vintage age. Due to technological imbalance, wastage is around 52% to 55 %. Presently the processing industry relies upon local manufacturers of machinery and equipment with a very few calibrated and high efficiency machines from reputable international suppliers.

## **Marketing in the local Markets and Exports**

Roughly 82 % of Intermediate products from the mines are traded in local market with only 7 % going for exports with marginal value addition.

## **Proposed Strategy**

- A detailed marketing package has been developed. This package is based on, identification of buyers in the target markets, an effective distribution system, the product and strategy for entering in to these target markets.
- Improvement in qualitative and quantitative productivity is proposed through technology upgradation and human resource development. Machinery upgradation and technology acquisition are the main stay of technology improvement process. A comprehensive package is being developed to make this sector technology efficient.
- Mineral specific financial packages including mine Collateralization are planned to support investment activities at mines.
- Investor friendly Regulatory Framework and export oriented fiscal regime has been developed for promoting investments at mine sites.
- Considering institutional significance and potential it is assessed that, regulatory bodies, mining and industry associations need to be reorganised and strengthened.
- Infrastructural facilities including link roads and feeder roads at Marble and Granite bearing areas have been worked out for the country.

Proposed plan require an investment of approximately Rs.1.2 billion in three years period with 90% coming from private sector and banks. Exports are planned to increase from current US \$ 4.9 million to US \$ 40 million per year in three years time.

# Chapter 1

## 1.1 Introduction and General understanding

This report on marble and granite sector has been prepared by SMEDA to facilitate policy makers and stakeholders for identifying the potential and prospects of this industry in Pakistan and to determine their future course of action.

SMEDA has selected this sector for developmental intervention due to the following reasons:

- a. Known occurrence of huge deposit in NWFP, Sind and Baluchistan, albeit non-estimated.
- b. Presence of a large number of primary and secondary industries, roughly 2000, with employment of over 25000 people in Karachi, Lahore, Rawalpindi & Peshawar.
- c. A rather strong linkage with transport sector, proposing opportunity for indirect benefits.
- d. Possibilities of manifold incremental value addition for existing players in the industry.
- e. Good prospects for increased job creations and
- f. Ample opportunity for exports.

In order to develop understanding of the reader, dimensional stone is defined both on scientific and commercial point of views. World situation in the dimensional stone, its production, processing and exchange is discussed in detail to develop awareness on the global situation in this sector. In the second part of this report Pakistan's existing scenario is presented to know as to where do we stand throughout the value chain from mining up to marketing of the finished products. In the end a comprehensive sector development plan is presented for intervention in different strategic areas of the sector.

While preparing this report meetings were held from time to time with the associations and regional groups of the industrialists and mine owners to probe into the problem areas of the industry as a whole.

In the process of interacting with the marble community, following objectives were elemental:

- I. To collect in-depth information on marble and granite sector and to cross check the information gathered through different sources.

- II. To develop confidence of the stakeholders upon SMEDA for developing an acceptable plan aimed at uplifting the sector.
- III. To build rapport with the stakeholders for developing understanding on strategic areas of the plan.

The exercise of developing this plan includes close liaison with the industry to foster understanding and confidence for effective and efficient implementation. This is continuous activity and will bear necessary changes incorporated from time to time.

## **1.2 Research Methodology**

### **1.2.1 Secondary Data Collection**

Secondary data including World Stone Report 1998, Research papers, Journals, Articles, periodicals and reference books were consulted for obtaining information on marble and granite sector as a whole. Internet sources were also utilized for soliciting current information on world exchange and major players in the sector. Economic survey of Pakistan, Bureau of Statistics reports, Export Promotion Bureau directory, Directorate of Industries and Mineral Development reports etc. were greater source of information on Pakistan dimensional stone industry.

### **1.2.2 Group discussions/ office studies**

Six groups within the industry were formulated to deliberate upon issues and problems faced by the sector. These groups include Marketing, Mining, Processing, Technology, Regulatory and Finance, headed by their respective convenors. Meetings were held in the office of SMEDA and in the industry from time to time for discussing the issues and analyzing the situation.

### **1.2.3 Interviews/ field studies**

Field visits of major marble and granite bearing areas were made by SMEDA experts to develop understanding about the sector and to know the ground situation on mines. During these visits existing mining techniques were thoroughly studied and possibility of advanced mining practices were discussed with the mining community. Some progressive miners had appreciated the idea for advanced mining and had promised to undertake the venture provided some regulatory issues hindering additional investment could be addressed by the relevant quarters.

### **1.2.4 Meetings, Consultations and Observations**

In addition to the meetings held with the industry, consultation session with support institution and individual consultants were held to facilitate formulation of the comprehensive development plan for the sector. Observations on the functional areas in the value chain were discussed in detail with the industry players

### **1.2.5 Foreign contacts and Collaboration**

Correspondence with international institutions, machinery manufacturers and suppliers was made during compilation of this report to ascertain the investment opportunities. Machinery and equipment prices were collected from leading countries including Italy for Marble and Granite (Processing and Mining machinery) to develop financial model for the report. Support organizations including UNIDO, UNDP, IUCN, Swiss Development Contact, Italian Embassy were contacted for the possibility of support in mine development, training institutes, joint ventures and technology transfer. Besides understanding is being developed with Italian Institute for Foreign trade (ICE) and Italian Association of Marmomachines (IAM) for institutional development and exchange programmes.

## Chapter 2

### Dimensional Stone

#### 2.1 Definition of Dimensional Stones

All natural stones including marble, granite and slate, which can be cut to sizes, polished, and used for construction purposes, are referred to as dimensional stones. Each of these stones represents a family of similar stones, with various combinations of different minerals. The major distinction is made on the basis of their base mineral which is Calcium compounds (calcareous) for marbles, Silica compounds (siliceous) for granite and Shale clay for slate.

Dimensional stones are characterised by aesthetics/ acoustics and practicality in use. Their apparent occurrences have lent them to many uses for centuries particularly construction and allied uses. Their different chemical, mineralogical & physical properties determine their appropriate extraction and processing requirements, in addition to bearing upon their end use.

##### 2.1.1 Marble

Marble is a crystalline, compact variety of metamorphosed limestone, consisting primarily of calcite ( $\text{CaCO}_3$ ), dolomite ( $\text{CaMg}(\text{CO}_3)_2$ ) or a combination of both minerals. Pure calcite is white, but mineral impurities add color in variegated patterns. Hematite, for example, adds red; limonite, yellow; serpentine, green; and diopside, blues. Extensive deposits are located in Italy, India, Pakistan, Greece, Brazil, China, Afghanistan, Turkey, Great Britain, and in the United States. Commercially the term *marble* is extended to include any rock composed of calcium carbonate that takes polish, including ordinary limestone. The term is further extended in the loose designation of stones such as alabaster, serpentine and other soft rocks. Specific gravity of marble ranges between 2.68 to 2.72, which determines density of the stone.

Marble is a durable stone in dry atmosphere and when protected from rain. The surface of marble crumbles readily when exposed to moist or acid atmosphere. Purest form of marble is statuary marble, which is white with visible crystalline structure. The distinctive lustre of statuary marble is caused by light penetrating a short distance into the stone and then being reflected from the surfaces of inner crystals.

##### 2.1.2 Granite

Granite, is igneous rock of visible crystalline formation and texture. It is composed of **feldspar** (usually potash feldspar and oligoclase) and **quartz**, with a small amount of **mica**

(biotite or muscovite) and minor accessory minerals, such as zircon, apatite, magnetite, ilmenite, and sphene. Granite is usually whitish or gray with a speckled appearance caused by the darker crystals. Granite is mainly preferred for its use in the exterior applications including funeral trade.<sup>1</sup> Variety of colors in granite is traded in the world market with different price tags. High price is fetched for the rare colors including Jet-Black, Pearl Blue and Deep Green. These colors are found in South Africa, Brazil, Norway, India and Pakistan.

The specific gravity of granite ranges from 2.63 to 3.30. Granite has greater strength than sandstone, limestone or marble and is correspondingly more difficult to quarry. It is an important building stone, and its maximum usage is in the external flooring and facing followed by internal flooring.

### **2.1.3 Slate**

Slate is dense, fine-grained rock, formed by the metamorphism of shale or clay or more rarely of igneous rocks. The process of metamorphism results in consolidation of the original rock and in formation of new cleavage planes along which slate characteristically splits into thin, broad sheets. Many rocks that show “slaty cleavage” are by extension loosely called slate. True slate is hard and compact and does not undergo appreciable weathering. The basic minerals comprising slate are quartz, mica and hematite. Apatite, graphite, kaolin, magnetite, tourmaline, and zircon may occur as minor accessory minerals. Slate is commonly bluish-black or gray-black in color but red, green, purple, and variegated varieties are also found. Slate is quarried usually in open pits and rarely in underground workings. The stone splits best when it is freshly taken from the quarry. Specific gravity of slate ranges from 2.6 to 2.8. Slate is used for floors, roofs, electrical panels, window and doorsills, baseboards, stair treads, paving stones, laboratory tabletops and sinks. It is widely used for structural and industrial purposes, polished slate is used in interior designs as well.

### **2.1.4 Onyx**

Similar to most of the other forms of marble, it is composed of compact rocks of carbonate nature of sedimentary origin formed through chemical precipitation usually in underground cavities. Generally found in the form of big lenses and patches with a low relief. If the crystals are particularly large (some centimeter) and visible to the naked eye, these rocks are known as alabaster. Specific gravity of Onyx ranges between 2.6 to 2.8. Onyx is mostly green in color with fine texture, nevertheless bands and patches of red, brown, and white are common, with rare patches of golden. Green variety is more valuable because it is used for special works in many parts of the world. Major deposits are located in Mexico, Iran and Turkey with best green variety in Afghanistan and Pakistan.

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<sup>1</sup> world stone report 98

## 2.2 Selection Criteria/ Marketability of dimensional stone

Selection of dimensional stone is normally a function of esthetics attached with the particular purpose and end use. They are graded on the following features:

### 2.2.1 Color

Color is the most important esthetic element that determines chances of marketability of the product. Preferences for color of dimensional stone vary from market to market, from time to time and for stone type. Presently various shades in white color of marble, white and green in onyx, dark gray and green colors in slate, and deep colors in granite are preferred in the European markets. Middle East and Far Eastern markets are interested in white, black and beige colors in marble, light and deep colors in granite and green colors in onyx.

### 2.2.2 Pattern

The pattern is given by the weave i.e. by the spatial distribution of the elements comprising the rocks. The pattern is derived from overlapping layers of different colors. Veined pattern is caused by veins crossing the ground mass of rock. Either giving the material, a well-defined direction or forming more or less uneven weave, in case of randomly arranged veins. In the veined pattern, normally found in marble, cutting direction is very important as this highly influences its appearance. Homogenous patterns (usually found in granite) do not require cutting direction.

### 2.2.3 Grain size

This defines the size and shape of the crystals or lithoid elements that constitute the rock. There are three major categories of the grain size of dimensional stone; **fine grain**, **medium grain** and **large grain** material. The grain size does not usually influence the esthetics of the material but has its impacts on the usage. Fine grain material has micro hardness and can be applied in the load bearing areas and sharp corner while medium and especially the large grain material is avoided to be used in the load bearing areas and sharp corners in the wake of its breakage and cracks.



Market Segmentation According to Pricing and quality preference

<b>Quality</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>
	- Fine Grain	- Medium/Large Grain	- Large Grain
	- Homogeneous Pattern	- Homogeneous/Heterogeneous Pattern	- Heterogeneous Pattern
	- Rare Colors	- Rare/Common Colors	- Common Colors
	- Fine Glaze	- Fine Glaze	- High Glaze
<b>Price</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>

(Source: Industry analysis and experts opinion)

Although color plays a dominant role in price determination but other attributes as explained in the above table also play a vital role in the marketability of the dimensional stone. If the product is rare in color and with fine grain and homogeneous pattern will attract discerning customers with price on the higher side. Those with medium grain, common colors and homogeneous pattern are priced in the middle range, while in the same category products with rare colors having large grain size and heterogeneous pattern are still ranked in the medium price range.

## 2.3 Major Product Categories

Stone extracted from the mines is raw material for the processing industry. Product types are described in two major categories “mining and Processing”.

### Mining

#### 2.3.1 Raw Blocks

Standard sizes of the block in the international market are having the following specifications.

Length	:	1.9 meter, 2.6 meter
Width	:	1.4 meter, 1.8 meter
Height	:	1.1 meter, 1.4 meter, and 1.8 meter

Standard weight of these blocks are 13.7 tons- 22.7 tons. There are however large size blocks weighing up to 30 tons.

Unfortunately in Pakistan primitive mining techniques does not allow extraction of standard blocks. In addition Poor infrastructure with pathetic road condition impedes transporting heavy loads, thus restricting the product to smaller sizes with irregular shapes. Mine products in Pakistan can be classified as under.

#### **a. Large Blocks**

These blocks are generally bigger in size weighing upto 8 tons and above in rare cases. These are priced on the average Rs.400 per tons for the lower quality material (quality here is referred to as color and evenness of shads and similar other aesthetic measures of the stone, it can go up to Rs.2000 a ton, for good colors). Lager blocks are extracted normally in limited quantities at the mine sites as blasting results in producing more fragmented and small size material. Out of the total 10% is extracted as large blocks.

#### **b. Small Blocks**

These usually range between 5-7 tons. Price of these blocks for the low quality material is Rs.200 a ton and may go as high as Rs.1, 200 per ton for good quality material. These blocks are cheaper because of their size as slabs, a high value added product, can rarely be obtained from them at the processing end. These blocks have share of 10% of the total quarry production. Together with large blocks they constitute 20% of total out put.

### **2.3.2 Boulders**

These are comparatively small round blocks with standard weight of 2 tones. These are normally byproducts in the international mining. In Pakistan boulders form main product line. Boulders are priced with low quality material at Rs.120 per ton and Rs.300 for better quality material. This category of mine extract contributes to 30% of the total quarry production in the domestic mines. Boulders are used for making tiles of size, 12 x 12 inch, 6 inch x 6 inch, 6 inch x 4 inch. Good color material is used for manufacturing handicrafts including, office table sets, flower vases, ashtrays etc.

### **2.3.3 Chowka**

Chowka is smaller than boulders usually weight upto 50 kg apiece, cut and processed by micro units on machinery having 18 inches cutters. These units process Chowka for small tiles like, 6 inch X 4 inch, 4-inch X 4 inches etc. In the international mining chowka and Kanda are considered to be mine wastes. Price of chowka in the local market for low quality stone is Rs.80 per ton and for better quality Rs.15 0. Total extraction of chowka from mine is around 40% of the total production. Other buyers of this product are crushing units, which produce *chips* of different sizes (used normally in the flooring).

### **2.3.4 Kanda**

Kanda is the local terminology used for the scrap produced at the mine site resulting from blasting. Good color material is used for *chip* making. Price of Kanda varies between Rs.30 to Rs.50 a ton or some times even less. Kanda contributes to 10 % of the quarry production. Among the other usage of Kanda include construction, floor bedding and wall making.

## **Processing**

### **2.3.5 Intermediate Products**

Intermediate products require further processing before they are sold in the market to the consumers or ready for their use. These include slabs and unfinished tiles of different sizes and thickness. Slabs are normally sold to the local processors and distributors, however some of the large size good quality slabs are exported.

#### **a. Slabs**

Slabs are large semi processed sheets of marble stone with varied sizes and thickness of 2 inch. They are further processed in the local industry or exported to the international markets. Slabs are cut on gang saws from large blocks of marble and granite. This product is used for tabletops, kitchen tops, wall facing, flooring and other allied purposes. Price of slab varies with the quality of material and the size of the sheet. For low quality material and small size of slab (from 8 to 12 square feet), the price is Rs.1400 per ton. For large size slabs (from 13 to 18 square feet or above) with low quality material and properly sorted sheets the price is Rs.1700 per ton.

#### **b. Unpolished Tiles**

These are processed and sold by units normally lacking machinery to finish and section the material. These are available in different sizes, colors and shades. These tiles are polished normally after application at the desired surface. Main attraction for the consumer for this product is its low price. Unpolished tiles are sold comparatively cheaper at Rs.17 to 45 per square foot for (12-x12 inch) size with 9/8 inch in thickness. This product is also purchased by small and medium processing units at Lahore and Karachi, who process is further including sectioning and polishing and sell it to the market.

### 2.3.6 Finished Products

Finished products include, properly cut to size slabs, tiles of different sizes and varieties, and decorative. These are high value added products and are sold at higher prices, depending on the stone colors. The designers and architects normally determine the sizes of finished tiles. Finished product can be sold in the local markets as:

#### a. Polished Tiles

These are the fully processed tiles sold in the market at competitively higher prices, which depend on vein structure color & shades. The price in Pakistan ranges between Rs.50 to Rs 150/- per square foot for marble and Rs 350-500 per square foot for granite. In the countries with developed processing base highly calibrated tiles are produced and traded in the world market with price as high as \$6 per square foot.

#### b. Decorative Items

Decorative items including, pillars, fire places, railings, sculpture, flower vase, ashtrays, tabletops, office table sets and many other similar items are produced in many countries of the world. In the countries where labor cost is high, carving is done with CNC machines. In Pakistan these items are produced all over the country with manual labor. Major cluster of these items lies in Karachi, where 400 units are involved in this activity followed by a few units at Lahore and Rawalpindi. Prices of these items vary from product to product, the quality of craftsmanship, and stone used in these products. Around 5000 tons of marble and onyx are fabricated in the decorative products subsector. Total exports of these items account for \$ 11.1 million in 1997-98 in addition to small quantities sold locally. See detailed chart on destination of finished decorative products in the [annexure](#).

### 2.3.7 Marble Chips

Marble Chips are tiny pieces normally of crushed marble used in flooring and facing in the construction industry. These are processed on completely different machinery set up that includes stone crushers of various grades. They vary in size from large grains of 1 inch to 0.5 centimeter, depending on the choice of the consumer. *Chips* are sold at Rs.20 to 25 per bag of 50 kg.

## Chapter 3

# World Dimensional Stone Industry

### 3.1 History and Background

Dimensional stone has been mined and cut for centuries, but mass production, technology and quarry engineering was introduced in the twentieth century. In 1960's mechanization of mines and quarry development was initiated in Europe<sup>1</sup>. The world stone industry registered an annual growth rate of 13.3% since the late 70's with world production at 49.5 million tons and exchange at 18.4 million tons in 1997. Major factors attributed to the growth of dimensional stone are as follows;

**e) Technology.**

Technology for extraction, handling and processing has advanced tremendously in the second half of twentieth century. Since 1960s quarrying of the dimensional stone has started as an industrial activity with proper quarry designing and development, based upon scientific geodata collection and analysis. Similarly improved machinery designs suitable for high performance cutting and innovation in the handling equipment has changed capability profile.

**f) Infrastructure and transportation.**

Transportation of stones has become very convenient since last few decades because of infrastructure development and innovation in the handling and transportation equipment including loaders, cranes and bulk carriers.

**g) Growth of Small enterprise.**

Due to various technological options both at mining and processing operations small-scale enterprises have made significant entry because of the wide range of investment opportunities. It remains a labor-intensive industry with comparatively low volume of investment is one of the factors attributing to the shift of the technology in this sector from West to East. There are, however, hi-tech, fully automated units requiring high investment, but these are limited in number.

In the year 1997 production and consumption of stone grew by 15.4% and, quantitative trade by 10.7%. This trend is indicative of increased usage of dimensional stone by developers, contractors and households.

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<sup>1</sup> Frederick Bradley, "Marble quarrying."

#### h) Focused marketing efforts

Almost all stone producing and processing countries actively participate in the international exhibitions. Italy organizes 4 events on the average every year. In the rest of the world more than 50-55 such events takes place every year. Ware housing compounds at various locations in the stone producing countries are established to ensure continues supply of consistent product to the buyers.

### 3.2 World Production of Stone

World production at 60.5 million reflects the success of technology advancement. More than 50% of total world production is shared by 4 countries and next about 20% by 8 countries, remaining 25% shared by over 30 countries. Among the leading producers, China remained at top with 27.65% of the world share followed by Italy with the share of 16.02%. Spain and India's position in the global production is third and fourth with shares of 9.18 % & 7.93% respectively (see table No-1). Pakistan on the basis of official figure of 0.35 million tons produced in 1998 has less than 1% of the world production share.

Table 1

World Production 1998		
Countries	000 tons	Share world
China	16740	27.65
Italy	9700	16.02
Spain	5557	9.18
India	4800	7.93
Portugal	2100	3.47
Brazil	2100	3.47
Greece	2000	3.30
USA	1080	1.78
South Korea	1900	3.14
South Africa	961	1.59
France	1100	1.82
Turkey	2200	3.63
Germany	490	.81
Mexico	600	.99
Pakistan	350	.58
Others	8859	14.63
<b>Total</b>	<b>60537</b>	<b>100</b>

(Source: world stone report 1998)

Four major producers including Italy, China, Spain and India have half of the world production. Among the major Asian countries contributing to the growth of sector are Taiwan, China and India. Taiwan has scarce mineral resources, and is dependent on imports. It has however, invested in Chinese mines to feed its processing industry.<sup>1</sup>

### 3.3 Trends in the usage of Dimensional stone types.

Noticed Variations have been found in the production of dimensional stone during the last few decades in the international markets. Marble has shown growth of 10% per annum, its relative share has declined considerably from 76.4% to 55.8%. Granite has moved upward with the average of 14% from 1976 to 1997. In 1997 the share of granite remained 39.1%, more than double of its relative share in 1976 (see table 2). Slate has shown steady trend in the demand over the last two decade.

Previously slate was used for funeral trade but now the usage has diversified. Slate is used for external facing, external flooring, footpaths and pavements etc.

Table 2

#### Historical Production of Dimensional Stone

Years	Marble 000 tons	Marble %	Granite 000 tons	Granite %	Slate 000 tons	Slate &	Total 000 tons
1976	13,600	76.4	3,400	19.1	800	4.5	17,800
1986	13,130	60.5	7385	34.0	1195	5.5	21,710
1996	26,450	56.9	17625	37.9	2,425	5.2	46500
1997	27,650	55.8	19350	39.1	2500	5.1	49,500
<b>Growth</b>		<b>10.0</b>		<b>14.7</b>		<b>9.9</b>	

(Source: World Stone Report)

### 3.4 World Exchange of Dimensional Stone

Total world exchange remained at 18.4 million tons among the producing, processing and consuming countries while rest of the produce (31.1 million tones) was consumed locally by the producing countries. India has contributed tremendously in the 90's and showed a growth of more than 33% in 1997 over 1994. The exchange of Marble and Granite in the international markets is typically more for raw stones which, includes a very little proportion of 12%, as raw marble, but a very high proportion of 46% as raw granite. Simple and special finished products, which constitute 44% trade by weight, include 47% marble and 53% granite. Interestingly Key players like Italy continued to import heavy quantities of some varieties of raw marbles while exporting some others at the same time (see table 3).

<sup>1</sup> Business stone 99

Table 3

**Export Distribution in Leading Countries 1997(quantity in 000 tons)**

Countries	Raw Marble Quantity.	Raw Marble %	Raw Granite Quantity.	Raw Granite %	Simple Finished Quantity.	Simple Finished %	Special Finished Quantity.	Special Finished %	TOTAL
ITALY	596	30	204	3	224	10	2503	37	3527
CHINA	49	2	1006	13	486	22	1540	23	3081
INDIA	67	3	1670	22	25	1	297	4	2059
SPAIN	329	17	428	6	12	0.5	351	5	1120
PORTUGAL	77	0.4	224	3	384	17	226	3	911
S AFRICA	0	0	844	11	0	0	50	1	894
BRAZIL	5	0.2	773	10	0	0	71	1	849
BELGIUM	26	1	105	1	170	7	94	1	395
FINLAND	0	0	378	5	0	0	0	0	378
TURKEY	52	3	0	0	108	5	174	2	334
GREECE	98	5	0	0	0	0	207	3	305
CANADA	0	0	195	2	1	0	107	2	303
USA	25	1	183	2	1	0	72	1	281
FRANCE	45	2	96	1	16	0.7	107	2	264
POLAND	0	0	0	0	45	2	0	0	245
GERMANY	6	0.3	131	2	62	3	35	0.3	234
CZECH. Rep	0	0	0	0	222	10	0	0	222
NORWAY	0	0	214	3	0	0	0	0	214
SWEDEN	0	0	204	3	0	0	0	0	204
TAIWAN	0	0	0	0	0	0	126	2	126
S. KOREA	0	0	72	1	1	0	50	1	122
Others	602	30.5	789	10.2	289	13	666	10.4	2316
TOTAL	1,987	100.	7515	100.0	2245	100.0	6675	100.0	18422

(Source world stone report 95)

Giants like Italy and china dominated exports with 19% and 17% respectively who had strong presence in raw as well as finished products. Portugal and Spain provided considerable finished goods. The total exports continued to be dominated by raw stones at 58% of weight particularly due to India, China, South Africa and Brazil. While India with 22% and China with 13% of the total raw granite exports was on top of the list followed by South Africa 11% and Brazil 10%.

In the finished product category with 53% granite and 47% marble Italy leads followed by China and Portugal.

Table 4

**Import Distribution in leading Countries 1997(quantity 000tons)**



COUNTRIES	RAW Marble quantity.	RAW Marble %	RAW Granite quantity.	RAW Granite %	SIMPLE FINISHED Quantity.	SIMPLE FINISHED %	SPECIAL FINISHED Quantity	SPECIAL FINISHED %	TOTAL
<b>ITALY</b>	334	17	1692	23	46	2	68	1	2140
<b>JAPAN</b>	29	1	547	7	260	12	1240	19	2076
<b>GERMANY</b>	39	2	412	5	857	38	685	10	1,993
<b>TAIWAN</b>	138	7	1416	19	6	0.2	94	1	1,654
<b>HONG KONG</b>	84	4	345	5	7	0.2	537	8	973
<b>CHINA</b>	132	7	231	3	13	0.5	507	8	883
<b>FRANCE</b>	65	3	218	3	165	7	117	2	565
<b>SPAIN</b>	87	4	386	5	2	0	86	1	561
<b>HOLLAND</b>	110	6	87	1	258	11	95	1	550
<b>BELGIUM</b>	22	1	223	3	99	4	161	2	505
<b>S.KOREA</b>	4	0.2	193	3	1	0	231	3	429
<b>SWITZERLAND</b>	92	5	156	2	78	3	96	1	422
<b>S. ARABIA</b>	25	1		0	-	0	345	5	370
<b>LEBANON</b>	168	8	17	0.2	-	0	118	2	303
<b>U.KINGDOM</b>	14	0.7	88	1	28	1	82	1	212
<b>SINGAPOR</b>	27	1	18	0.2	-	0	165	2	210
<b>AUSTRIA</b>	5	0.2	36	0.4	51	2	120	2	94
<b>PORTUGAL</b>	3	0.1	50	0.6	3	0.1	27	0.4	83
<b>Others</b>	591	29.7	1190	16	367	16	919	14	3068
<b>TOTAL</b>	1987	100	7515	100	2245	100	6675	100	18422

(Source: World Stone Report 98)

On the import side Italy and Taiwan continued to be the leaders due to heavy imports of raw granite. Japan and Germany were importing almost equal amount of finished goods, predominantly granite. The other major importers include Hong Kong and China with greater imports of finished goods but considerable raw granite as well. Far East comes out as the major importing region followed by Italy and Germany in Europe.

Among the key importers in the raw marble are Italy with 17% of total imports, followed by Lebanon, Taiwan and China, while in the raw granite import Italy remained again on top followed by Taiwan and Japan. In the finished products import Japan is the world leader with 19% followed by Germany 10%. Italy and Taiwan have significant share in the raw material purchase because of their processing strength and hands on marble trade (see table No-4).

## 3.5 Import and Export of Dimensional Stone According to Product

### 3.5.1 Raw Marble

Raw marble includes calcareous stones produced in the quarry in squared block form of various sizes. In the overall global trade Italy has a leading position with traded quantity of 9,30,000 tons of raw marble, which include 5,96,000 tons of exports and 3,34,000 tons of imports. Second in the row is Spain with total traded quantity of 4,16,000 tons including 3,29,000 tons of exports and 87,000 tons of imports of the raw marble.

### 3.5.1 Raw Granite

Raw granite is a quarry product of different size of blocks in squared shape. Among the key players in the world market for granite and other siliceous stones are Italy with 1,896,000 tons of traded quantity including 204,000 tons of exports and 1,692,000 tons of imports, followed by 1,670,00 tons of raw exports by India, 1,416,000 tons of raw

import by Taiwan. China trade of raw granite is 1,237,000 tons including exports of 1,006,000 tons and imports of 231,000 tons.

### **3.5.2 Simple Finished Marble**

Simple finished marble includes slabs, unpolished tiles of different sizes and specifications. These products are processed and given final finish at the importer end. China and Portugal are leading simple finish exports with 228,000 tons with a share of 24% and 19% respectively of the world exports in this category. Followed by Italy with 105,000 tons or 11% of market share. Many other countries are involved in the export trade in this category but their share is too less to be mentioned separately. In the import of simple finished marble Germany is leading with 403,000 tons or 42% of the total share, followed by Japan and Holland with 122,000 and 121,000 tons or 13% share for each. Other major players are France, Belgium and Italy with 8%, 5% and 2% respectively.

### **3.5.3 Simple Finished Granite**

Among simple finished category of granite are slabs, tiles and structural works that need further processing that includes cutting and polishing. In this category of the granite trade China is a leader with total trade of 258000 tons or 24% of the total market share. Portugal with 204,000 tons, having share of 19% is in the second position while Italy with the export of 119,000 tons is in the third position having market share of 11%. Czech Republic with 118,000 tons or 11% share is in the fourth position. Other countries in this category of the world trade are Belgium, Germany, France, Spain, and Poland. Among the major importers of the world in this category are Germany, Japan and Holland. Germany imports 454,000 tons of granite having 42% share, while Japan imports 138,000 tons or 13% of the total and Holland imports 137,000 tons or 13% of the world market. France is fourth in importing with 87,000 tons or 8%.

### **3.5.4 Special Finished Marble and Granite**

Special finish category includes tiles, structural and other special items including, table tops, kitchen tops, stairs, sculptures etc. In this category of the dimensional stone trade Italy is the market leader with 2,503,000 tons of trade with 37% share in the world trade. China follows with 1,540,000 tons or 23% of market share in this category. Spain and India are placed in the third slot with 5% share each having quantitative exports of 351,000 tons and 297,000 tons respectively. In the special finished category of marble and granite Japan is having a leading position among the importing countries with 124,000 tons or 19% share in the world market. Germany is followed with 685,000 tons or 10% share. Other major players in this category include, Hong Kong and China with 8% each and quantitative contribution of 537,000 tons and 507,000 tons respectively.

### **3.5.5 Slate**

Slate having total production of 2.5 million tons in 1997 in the world has quantitative exchange of 769,000 tons or 30% of the total produced. Domestic consumption of the producing countries is thus 70%. Among the key exporters of slate include Spain having 61% share, China 6% in total exports, Italy 5% and Brazil 4% of the total share. India is exporting 11,000 tons of slate with 1.4% share in the world market. Major importing countries are France, importing 230,000 tons or 30% of the total, Germany is importing 146,000 tons having 19% import share and United Kingdom imports 67,000 tons with 9% share. Taiwan, Belgium, USA and Canada are at the lower end in the import of slate. Taiwan's import is 60,000 tons i.e. 8%, Belgium contributes to 7% of the total, USA with 6% and Canada at 3% of the world market.<sup>2</sup>

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<sup>1</sup> Categorization of simple finished product into marble and granite being estimated at 47% and 53% with the help of international data on cumulative trade for marble and granite in both categories of simple finish.  
world stone report 98

### 3.6 World Processing

Processing of stones in the industry has seen many improvements in the last 30 years. Cutting, Sizing chamfering or profiling and polishing technology has changed from simple blades, wires and cutting tools to very high efficiency cutting segments and abrasive materials including automated CNC machines etc. (see Annexure).

Italy, Germany, France, Belgium, Spain, Portugal, Netherlands, Turkey and Switzerland in Europe, United States in America, Lebanon in the Middle East, Taiwan, Japan, South Korea, Malaysia and China in Asia have strong industrial base for the processing of dimensional stone. (See table 5). Processing has shown an increase of 6.5% in 1997 over previous year same as the production growth. Processing yield is gradually increasing due to Research & Development and training programmes in the sector. Standard processing waste in the world is 41%, while in Pakistan it is 55%. Italy has processed 9.726 million tons in 1997 with the net produce of 5.738000 tons after 41% of the process loss. China is following with total processing of 7.058 million tons having net produce of 4.164 million tons. Spain by processing 3.876 million tons remained in the third position in the world market. Among the other key players are India 1.360million tons processed quantity, Portugal 1.9 million tons, Greece 1.75 million tons, South Korea 1.547 million tons, France1.34 million tons, Taiwan 1.1 million tons, Germany 1.15 million tons and Japan .576 million tons. Processing of dimensional stone involved two basic types

- (a) Gang saw cutting for Slabs
- (b) Block cutter with supporting range of cutters.

Gang saw is used at the basic processing stage to cut raw block into slabs of different sizes usually larger than the tiles, is still considered as the processing benchmark. This process is of prime importance as this contributes to 300% in value addition. Italy is on the top in the basic processing stage in granite stone cutting with 1530 gang saws that is

26.2 % of the world total (see table 5). Brazil is in the second position with 1250 granite gang saws and contributes to 21.4% of the world gang saw population. India had 110 gang saws a decade ago and had added another bunch of 100 gang saws in the last 10 years to bring thus figure to 210 and market share of 3.6%. Total strength of granite gangsaws in Pakistan is five in all.

Table 5

#### World Distribution of Granite Gang saws (1997)

Countries	More 10 years	Less 10 years	Total	%
Italy	1200	330	1.53	26.2
Brazil	1200	50	1.25	21.4
Taiwan	150	300	450	7.7
Spain	150	230	380	6.5
Japan	300	--	300	5.1
China	--	250	250	4.3
India	110	100	210	3.6
Thailand	--	180	180	3.1

South Korea	--	150	150	2.6
Portugal	100	50	150	2.6
Egypt	--	100	100	1.7
Saudi Arabia	10	60	70	1.2
Argentina	30	30	60	1
Indonesia	--	60	60	1
Belgium	--	40	40	0.7
Germany	--	30	30	0.5
Iran	--	30	30	0.5
Russia	30	--	30	0.5
Malaysia	--	30	30	0.5
USA	--	30	30	0.5
Others	100	410	510	8.7
<b>TOTAL</b>	<b>3.38</b>	<b>2.46</b>	<b>5.84</b>	<b>100</b>

(Source: World Stone Report 98)

### 3.7 Processing Machinery (Manufacturing and exchange)

In the manufacturing and trading of dimensional stone machinery Italy stands at leading position in 1997 with 54% share in exports. Total machinery and equipment worth \$ 494.68 million were exported.<sup>1</sup> Italy has exported machinery and equipment to India worth \$4.54 million in 1996, while in the same year export of machinery to Pakistan was \$1.12 million. Total worth of Italian machinery exports in 1996 in U.S dollar value was 505.19 million, 2% decrease from the previous year despite 5% price rise. Among other major partners in the trade are USA, Belgium, Taiwan, and Germany with percentage shares between 3 to 6% of total market (detail see Annexure)

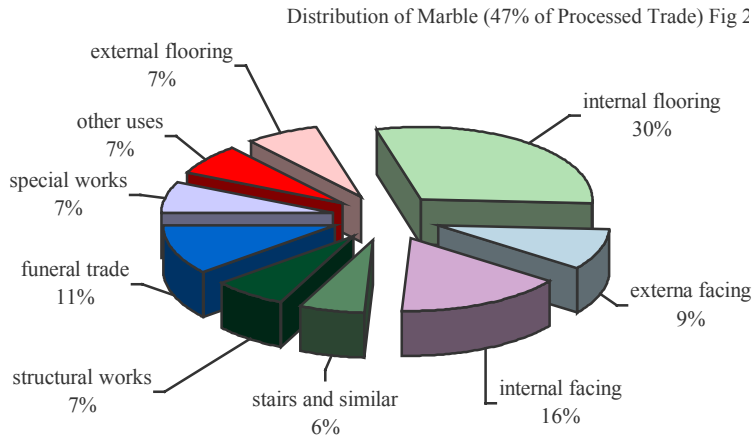
### 3.8 Uses of Dimension Stone

Major categories for usage of dimensional stones are architectural works, funeral trade and sculptures etc. In the architectural work that include construction and structural works total share of the dimensional stone is 70% while in the decorative, sculptures and memorial art etc. its share is 30%. According to their peculiar characteristics, including weather effects, color fading, load tolerance, edge cuts, water absorption, color choice, hygienic factor, hardness etc; various type of dimensional stones are used in different locations and places (see annexure).

#### 3.8.1 Marble or Calcareous Stones

<sup>1</sup> world stone report 98 & settore laideo, stone sector97

Restricted choice of marble for external applications is due to its porosity. They hardly sustain color and shine due to rainfalls and environmental pollution etc. Marble is preferred over granite for special works that include sculptures, decorative items, fireplaces etc. due their comparative softness.



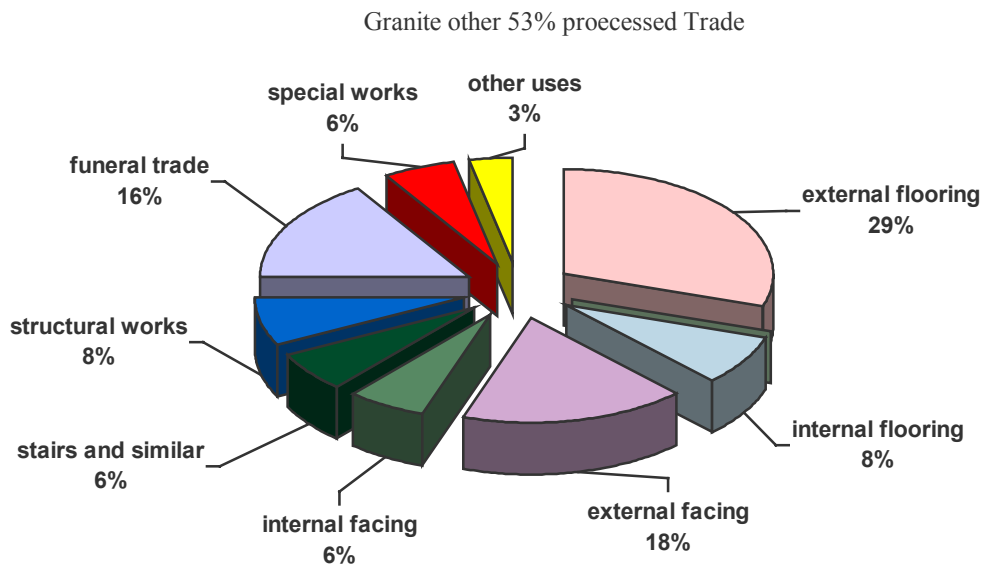
### 3.8.2 Granite or Siliceous Stones

Because of its uniform texture and hardness, granite is preferred for external usage. It is more durable as compared to marble and is economical in maintenance. Granite does not need re-polishing once it is polished and fixed at the desired place, while marble needs polishing every year or at least once in two years.

The granular formation and compactness of granite makes it non-porous and non-absorbent hence is more hygienic for the use in laboratories, kitchen, washrooms and other water exposed areas. Uniformity in texture gives better look to granite and is thus convenient in its application at the desired place.

Majority of the cities located closer to the sea, provide greater markets for granite as it can withstand the weather effects (moisturizing) better than marble.

Usage of granite in the special work, mainly involved in the making and fabrication of sculptures, decoration items etc. is lower as compared to marble. This is simply because granite is a harder material to work on due to its compaction and silica contents.



Source: World Stone Report 1996-97

### 3.8.3 Slate

Slate is being used for hundreds of years at various places that include, roofs, floors, pavements, footpaths, roads, garden, and in the funeral trade. Slate is normally used in the cold regions mainly in the European countries. Specific data on the percentage use of slate in the above given areas is not available.

### 3.9 Forecast of world Dimensional Stone Production and uses

World stone production is gaining momentum mainly due to its increased uses worldwide. Increased production, improved product and increasing standards, of living guarantee future prospects of the dimensional stone. Since 1976, average growth of the dimensional stone remained at 11%, while future projections are made at 8.25%.

Table 6

Forecast of world development in production and uses of stone

Year	Production (000 tons)			Uses
	Gross	Waste	Net	Mill. Sq. m
1996	46,500	19,070	27,430	507.5

1997	49,500	20,300	29,200	540.2
1998	53,580	22,000	31,580	584.2
1999	58,000	23,780	34,220	633.1
2000	62,790	25,740	37,050	685.4
2005	93,330	38,270	55,060	1,018.6
2010	138,750	56,900	81,850	1,514.2
2015	206,240	84,560	121,680	2,251.0
2020	306,500	125,700	180,800	3,344.8
2025	455,000	186,500	268,500	4,967.2

- Standard tile thickness of 2 centimeter, 18.5 square meter per ton is produced
- Compound growth rate of 8.25 per year on historical average of production and trade is taken

(Source: World Stone Report 98)

In the year 2006 total world production will exceed double of the production figure of 1997. This indicates greater potential existing in this sector for investing in future.

## Chapter 4

### International Success Stories and Bench marks

#### 4.1 International Success Stories

##### 4.1.1 Italy

Italy remained a leading country in the dimensional stone business for centuries. It has a strong base of model mines with highest average for quarry production and state of the art processing industry. Its contribution in research & development and human resource development for mining and processing is noteworthy. Due to prolonged association with this trade Italian have developed cultural affinity with stone development and the methods and techniques have been perfected on scientific lines. Adherence to quality standards has become a norm with industry through continuous improvements in mining processing and handling technology under institutionalized arrangements of associations backed by government patronage. Simultaneously industry has enjoyed strong infrastructure support coupled with presence of highly developed markets within and around Italy. It is estimated that Italian industry, which comprises many large mining and processing units, is very well diversified. The number of frame saws in Italy in 1997 were 1530, which is 26.2 of the world total. Through out 1990s, Italy's stone production remained stable with an average compound growth of 3% from 1994 to 1997. Italy has maintained its position of world leader in 1997 with its world share in quarry production of 17.2% or 8.5 million tons. In the world exchange Italy has a share of 31% with total quantitative import/ exports of 5.7 million tons in the same year.

Italy has a strong base of modern mining with latest technology. It has tremendous infrastructure facilities available throughout the mineral bearing areas and the processing clusters. Abundance of warehouses are available in the vicinity of processing clusters and sea ports, that ensure supply of consistent products.

Italy is actively participating in the exhibitions/ trade fairs on the globe. On the average four international events are organized by Italy, which attract participants from more than 100 countries in each of these events. Italian government has established the Italian institute for foreign trade (I.C.E). This institute in accordance with directive established by the Ministry for Foreign trade promotes trade and International cooperatives for Italian small and medium sized enterprise and consortia. ICE has 16 offices in Italy and around 80 offices abroad.

In 1995, Italy managed to keep off international competition fairly well. Its overall exports of marble and granite in blocks and slabs were 767,000 tons, showing an average increase of around 15% over the year 1994.



## **Key Success factors**

- Greater contribution to the Research and development actively both in the stone as well as in the machinery manufacturing (mining as well as processing).
- High degree of involvement in the Human resource Development activities with in the country and abroad.
- Highly developed information on markets and vigilant eye over international trends in the stone business.
- Promotion of Italian stone products and machinery in the international markets.
- Sufficient efforts in institutional development in the dimensional stone sector.

### **4.1.2 Greece**

The modern history of the Greece stone industry dates back to the 1960's when the public and private building industry in the regional markets boosted the exploitation of mineral reserves, thereby allowing marble to become a stable product. There are practically infinite numbers of factors contributing to Greek supremacy in this field. A national heritage in construction and monumental works coupled with modern day technological developments in the field and presence of ever growing regional markets have contributed significantly, as have strong institutional and governmental assistance in development. Marble deposits and marble processing units are located throughout the country. Today there are over 4,000 different sizes of marble companies including some mega projects, which employ approximately 50/60,000 workers in all. The country's processing capacity is around 2.5 million tons with over 300 frame saws.

During 1995, production of marble was 2.55 million tons. Total exports of raw and processed marble exceeded 318,000 tons, showing an increase of more than 12% over 1994. Among the major stone importing countries from Greece were Saudi Arabia and the other Middle Eastern countries contributing to 50% of Greek exports. Domestic consumption in 1995 was around 657,000 tons.

## **Key Success Factors**

- Modern mining technology
- Greater degree of skills among the people employed in this sector.
- Better processing strength
- High degree of promotion in the international markets for Greek stones and better marketing practices.

### **4.1.3 India**

India has appeared in the world as one of the most dynamic countries in dimensional stone production and trade. The country is known in the world mainly as one of the most important producers and exporters of high quality granite and other siliceous stones. In 1997 India had gang saw strength of 210 units having 3.6% of the world share. Dimensional stone industry in India currently employs approximately 300,000 workers mostly in the small size enterprises. The industry has undergone widespread modernization over the last decade and has promoted the gradual transformation of family-run businesses into larger businesses with better prospects.

India has developed enormously in the mining technology while in the meantime has considerably upgraded its processing industry. India's production in 1995 totaled to 3.25million tons, 18% increase in the production from 1994. In the period between 1989 and 1995 India registered a growth of 60%. Exports in 1995 recorded an increase of 8% over 1994 from 1.21 million tons to 1.3 million tons. In 1995 raw granite exports reached record levels with over one million tons an increase of approximately 9.8% over 1994, taking India to the second leading exporters in the world.

India's principal partner is Italy, which purchased 478,000 tons in 1995, showing an increase on 1994 of over 20%. Other important purchasers of siliceous materials (Granite) were Taiwan, Japan and Germany. In the finished product exports, 199,000 tons were traded in 1995 with an increase of approximately 7% over 1994. This placed India fifth on the list of world finished product exporters, overtaking Portugal and closing in on Greece. The major importers were the United States, 62,000 tons (27% of all Indian exports), Saudi Arabia, Singapore and Germany. In 1995 the domestic consumption increased by 10%, indicating growing standards of living. In 1997 India produced 4 million tons of dimensional stone, again more than 23% of production of 1995. India has exported 1.7 million tons in raw blocks while 0.33 million tons in the finished products in 1997 with world market share of 11%. In the export of granite India had a leading position in 1997 with 1670,000 tons or 22 percent of the world exchange.

### **Key success factors**

- Government support in
  - (a) Regulatory framework and infrastructure facilities including warehouses.
  - (b) Technology development.
  - (c) Sector development through institutions building, marketing, financial and technological support.
  - (d) Market identification
  - (e) Export rebates
  
- Participation in International fairs and exhibition and aggressive promotion of the Indian products.
  
- Technology orientation at mines

### **4.1.4 Brazil**

With the greatest reserves of granite in the world and substantial deposits of marble and other dimension stones, Brazil is one of the main producers of dimensional stones, featuring third on the list of raw granite exporting countries behind China and India.

In 1995, Brazil's production of marble and granite was 1.95 million tons or 5% of the world production. This is 6% more than the production in 1994. Brazil produces all types of stone materials, granite and other siliceous material have a share of more than 70% of the total.

Compared to 1994, Brazil's international trade of dimension stone in 1995 rose by approximately 16% for granite and other siliceous material. Growth in the production of marble and other calcareous material was 42%, from 12,000 tons to 17,000 tons in 1995 over the last year. Brazilian black and pearl blue granite is favorite in the world market. In 1995, granite exports accounted for 88% of the total exports of the country. In 1997 Brazil produced 2 million tons of dimensional stone and exported 0.85 million tons, that include 0.77 million tons of raw granite.

### **Key success Factors**

- Huge deposits of world favorite color of dimensional stone
- Appropriate technology at mines
- Participation in the International events for promotion on stone products
- Sizable processing clusters supporting specialization of jobs and marketing cartels.

## **4.2 International Benchmarks**

Table 7

#### International benchmarks (Data 1997)

Countries	Production (000 tons)	Quarry wastage	Processing wastage	Gang saws (Granite)	Saw Load (000 tons)	Exports (000 tons)	Local Consumption (000 tons)
<b>Italy</b>	8500	50%	41%	1530	9726	3563	3093
<b>China</b>	7750	50%	41%	250	7058	3130	2613
<b>India</b>	4000	50%	41%	210	2305	2070	1027
<b>Pakistan</b>	1386	73%	55%	5	368	9	384

(Source: World stone report 98/ DIMD and own research)

#### 4.2.1 Production

In the world's total production of 49.5 million tons of the dimensional stone the above mentioned five countries contribute to 44%. Italy is leading with 17% of the world total, followed by China having 15.7%, India is placed at the eighth position with 8.1% while Pakistan with equally good reserve for marble and granite could get only 1% share in the world production. Italy and China continue to increase their production at 11% and 19% respectively in 1997. India had commendable growth in 1997 over 1994 with a big leap of 33.3%. Pakistan on the other hand witnessed slow trend in the sector with decrease of 4% over the previous year 1997.

#### 4.2.2 Mining Industry

Italy is pioneer in introducing mining technology in the world by extensive research and development done in this sector since the beginning of this century. Mining is done on modern lines in most of the countries by now, except few countries including Pakistan where uncontrolled blasting is the norm. Standard quarry wastage in the world is taken at 50% of the gross produce. This is mainly attributed to natural rock formation and structure. All the countries listed above achieve the standard as mentioned except Pakistan where the quarry loss is still 73%. Even 23% recovery of product is not exportable due to its irregular shape and cracks in the blocks. Only three mines in Pakistan use appropriate mining techniques and extract product of international standards. In the international markets only squared blocks are accepted. List of the standard mining machinery and equipment used in all these model countries is given in **annexure**. However the following exhibit indicate the technologies used in different levels of mining in different countries.

Exhibit 10

### Mining Technologies comparison within the Benchmark Countries

Countries (B.Mark)	Technology Levels	Infrastructure	Mining Techniques	Machinery used	
				Mining	Handling
Italy China	A	<ul style="list-style-type: none"> <li>- Developed link &amp; feeder Roads</li> <li>- Communication system</li> <li>- Water availability</li> <li>- Electricity provision</li> <li>- Raw Material Yards</li> </ul>	<ul style="list-style-type: none"> <li>- Geo Studies</li> <li>- Lab studies</li> <li>- Survey</li> <li>- Reserve studies</li> <li>- Quarry Designing</li> <li>- Benching</li> </ul>	<ul style="list-style-type: none"> <li>-Hydraulic Stich Drilling</li> <li>- Wire cutting</li> <li>- Chain saws</li> <li>- Belt saws</li> <li>- Water Jet</li> <li>- Flame jet</li> </ul>	<ul style="list-style-type: none"> <li>-Derrick cranes</li> <li>- Gantry Crane</li> <li>- Loaders</li> <li>- Shovels</li> <li>- Customized trailers</li> </ul>
India	B	<ul style="list-style-type: none"> <li>- Developed link &amp; semi developed feeder Roads</li> <li>- Communication system</li> <li>-Water availability</li> <li>- Electricity provision</li> </ul>	<ul style="list-style-type: none"> <li>- Geo Studies</li> <li>- Lab studies</li> <li>- Survey</li> <li>- Reserve studies</li> <li>- Quarry Designing</li> <li>- Benching</li> </ul>	<ul style="list-style-type: none"> <li>- Manual Stich Drilling</li> <li>- Wire cutting</li> <li>- Flame jet</li> </ul>	<ul style="list-style-type: none"> <li>-Derrick cranes</li> <li>-Tractors with front end buckets</li> <li>- Loaders</li> <li>-Shovels</li> </ul>
Pakistan	C	<ul style="list-style-type: none"> <li>- Semi Developed link &amp; non developed feeder Roads</li> <li>- No Communication system</li> <li>- Non availability Of Water/ Electricity</li> </ul>	<ul style="list-style-type: none"> <li>- Quarry opening</li> <li>- Blast mining</li> </ul>	<ul style="list-style-type: none"> <li>-Drilling</li> <li>-Uncontrolled blasting</li> </ul>	<ul style="list-style-type: none"> <li>-Tripod Cranes</li> </ul>

Our industry laggards have not taken a single step towards mechanized mining. The case of china is an eye opener who have allowed Taiwanese companies for joint venture in the main land and have attracted foreign assistance from Italy who have setup model quarries and training centers in China.

### 4.2.3 Processing Industry

Marble and granite processing industry is typical in nature, its efficiency is dependent on the quality of quarry products. In most of the above countries processing is done on highly sophisticated machinery for quality production. In Pakistan very few units are using these machines while rest of the industry uses locally fabricated machinery by few existing manufacturers in the country. These units develop machinery by reverse engineering (copying of foreign machines), without even doing the basics of machinery designing. Italian processing industry is far ahead of the world with locally manufactured machinery of high standards. Many countries have entered into collaboration arrangements with Italy and other leading stone machinery manufacturers in, Germany, USA, and Netherlands.

China's processing of 7,058,000 tons of raw stone indicates strong processing strength of the country. The saw load (stones put on main cutter at the first step) has an increasing trend in the last few years. It has grown in 1997 at 26% over 1994. China has imported US \$ 315.4 million of machinery and equipment in the period between 1994 & 1996. Out of the total \$136.93 m were imported alone from Italy. In 1997 a total of \$70.37 m of machinery was imported. Among the key machinery suppliers were Italy, USA, South Korea, Japan and Germany. In the last 10 years total strength of granite gang saws has grown to 250 units in China. This is the basic process in cutting stone

aimed at producing larger sheets and slabs. Processing waste of the Chinese processing industry is 41%, which is equal to the world standards.

Processing strength of India includes total saw load of 2,305,000 tons. It has shown upward trend in the process load for the last few years. In 1994, it was 2,026,000 tons, in 1995 an increase of 6% over the last year was witnessed, increase in 1996 was 11% over the last year, while in 1997 a decline of 3% over the last year was shown mainly because of increase in raw exports. India imported 6.67 m \$ of marble and granite machinery from different suppliers in the years 1994 to 1996. In 1997 its total import of machinery was decreased to \$5.31m. Main suppliers of machinery in 1997 were Italy \$2.28m, Germany \$0.84m, Netherlands \$0.56m and Switzerland \$0.51m. Total population of gang saws for granite in the country is 210 units. Processing waste of the Indian processing industry in 1997 was 41% of the total saw load.

Total saw load in Pakistan in 1997 was 374304 tons, far less as compared to China and India. No significant import of machinery was made during the last few years, which indicates that lesser attention was given to the sector by the government or private sector. It is estimated that the existing numbers of processing units in Pakistan are roughly 2000. These units can be categorized in micro, small and medium size units. There are very few granite processing units in the country where only five granite gang saws are in operation. These figure show that we have no match even with India in this field.

#### **4.2.4 Institutional Strengths**

Italy has a strong institutional arrangement for the promotion of stone industry. Associazione Italiana is the Italian Association of dimensional stone industry dedicated to research and development, trade linkages, arrangements of trade fairs and exhibitions. International federation of Association of producers of material, machinery, tools and equipment working for marble, granite and ornamental stones is housed in Italy. Besides, Government of Italy is also constantly supporting the sector and has established “Italian Institute for foreign trade” for promoting trade and international cooperation for Italian small and medium size enterprises and consortia. Its activities include continuous study and publication of markets trends, information, assistance, promotion and training for both Italian and foreign enterprises. Italian Marble Machinery Manufacturers (IMM) is also a leading institution dedicated towards growth and development of marble machinery sector.

There are five organized association of dimensional stones in China, Sichuan Stone Materials Industry Association, Shandong Stone Materials Industry Association, Hong Kong Marble and Granite Merchants Association, Zhejiang Stone Industry Association, and Guandong Provincial Stone (Marble and Granite) Industry Association. Besides, there are seven other building material associations who provide source of facilitation to the sector.

In India there is one association “ All India Granites and Stone Association” formed in 1983 with its office in Bangalore. The association has done commendable work in the research and development and exposing the sector to variety of events in the world, focused on dimensional stones. <sup>1</sup>In 1995 Government of India has set up a “Granite Development Council” for overseeing the development of Granite industry. Indian Govt has formulated mining rules relating to granite spending.

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<sup>1</sup> Search for excellence in Granite and stone industry/ paper by Guru Shastrimath

All Pakistan Marble Industries Association is the only endeavor in marble and granite sector in Pakistan. This body has a loose or rather amorphous structure with out any organizational capability or and has no proper direction for the promotion of the sector. They seldom feel any need for research and development activities and are unable to lead the private sector in the international markets.

# Chapter 5

## Marble and Granite in Pakistan

### 5.1 Current Status

Marble and Granite is the sixth largest mineral extracted among coal, rock salt, lime stone, china clay, dolomite, fire clay, gypsum, silica sand etc. Since 1990 mining & quarrying has consistently contributed 0.5 percent to the Gross Domestic Product.<sup>1</sup> In order to understand the profile of local marble and Granite industry following process flow is presented

According to the industry estimates 1.37 million tons of marble and granite were produced in 1997<sup>2</sup>. Out of this 6,176 tons were exported in the raw form, 3,976 tons in the intermediary product (slabs) and 3,335 tons in the finished form (tiles). Total worth of these exports in the monetary terms is US \$ 4.9 millions.<sup>2</sup> <sup>3</sup>In addition to handicraft marble and onyx product worth \$11.1 million. Domestic consumption remained at 1.37 million tons or 97% of the total volume. Current production has decreased by 5% compared to 1995-96 and 6.2% as compared to 1994-95. Among the major factors attributing to this decline are;

**a Slow down in the construction industry.**

With almost 97% of local consumption, the decline in Construction industry has worsely affected consumption and production of marble, faced recession in the current decade in general and in the last three years in particular due to various reasons including global recession that severely gripped our economy.

**b Lack of quality production**

In the prevailing circumstances the industry is unable to produce quality product for the export markets. Reason being the absence of appropriate technology. There are quite few units in the country, which have modern machinery and are capable to process dimensional stone according to the international standards yet these units can not facilitate large orders placed by the importing firms due to various limitations. The orders can not even be subcontracted to other existing units due to poor quality orientation. Most of the processing units in the country are equipped with local version of the cutting machinery with little or no calibration, high electricity consumption and low quality production. Products of these units have variation in the tile thickness as high as 1 to 2 mm, and are chipped at the edges whereas international standards allow variation in thickness up to 0.5mm for tiles and the edges properly chamfered. Uneven raw blocks are contributing to high processing loss because of the material structure, cracks in the blocks

and inability of extracting large sheets from these blocks. Another factor involved is the lack of skills among the processing workers, who have not been provided with required training on cutting techniques, even in the plants having imported machinery.

**c Incapability of meeting consistent supply**

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<sup>1</sup> ESP 1997-98

<sup>2</sup> Official FBS and other estimates at 433,482 tons is reviewed and discarded by all the experts

<sup>3</sup>FBS and own assessment



Existing distribution system both for raw as well as finished products is disjointed (see chapter 6 for detail). The processing units get their raw material supplies directly from the mines in small lots resultantly they can not ensure regular supply of similar products of the consistent grade, shade and color of material ordered by the buyer. These supplies may also be delayed or even stopped by the miners due to many reasons that include.

- \* Low production because of unscientific quarrying
- \* Incapability of doing product grading.
- \* Local issues including surface rent and right of way resulting into halting of mining operations
- \* Poor infrastructure due to which the trucks cannot carry heavy loads on contouring roads in the hilly areas.

Besides there is no arrangement of keeping stock at the processing units or at mines mainly due to financial constraints.

## **5.2 Regional distribution**

Mining of Marble and granite is carried out in NWFP, Baluchistan and Sind

### **5.2.1 NWFP FATA and Northern areas Contribution to the Sector**

The province produces about 87% marble, 1% Granite and 12% slate, which is about 82 percent of the overall production of the county. There are wide varieties of marble and granite with huge reserves available in the province. Among 160 millions tons of total estimated reserves of marble 158 million tons are in the NWFP (see table 8). Proper study on reserves calculation for Granite has not been undertaken so far, however a study conducted by as NGO in the northern areas indicate 414 million tons of marketable granite reserves in that area. Actual deposits of granite with multiple shades can be manifold. There are three major clusters of processing units in FATA area at Buner, Momand agency and at Peshawar. According to the official estimates there are 148 processing units in the province (see table 13).

### **5.2.2 Baluchistan Contribution to the Sector**

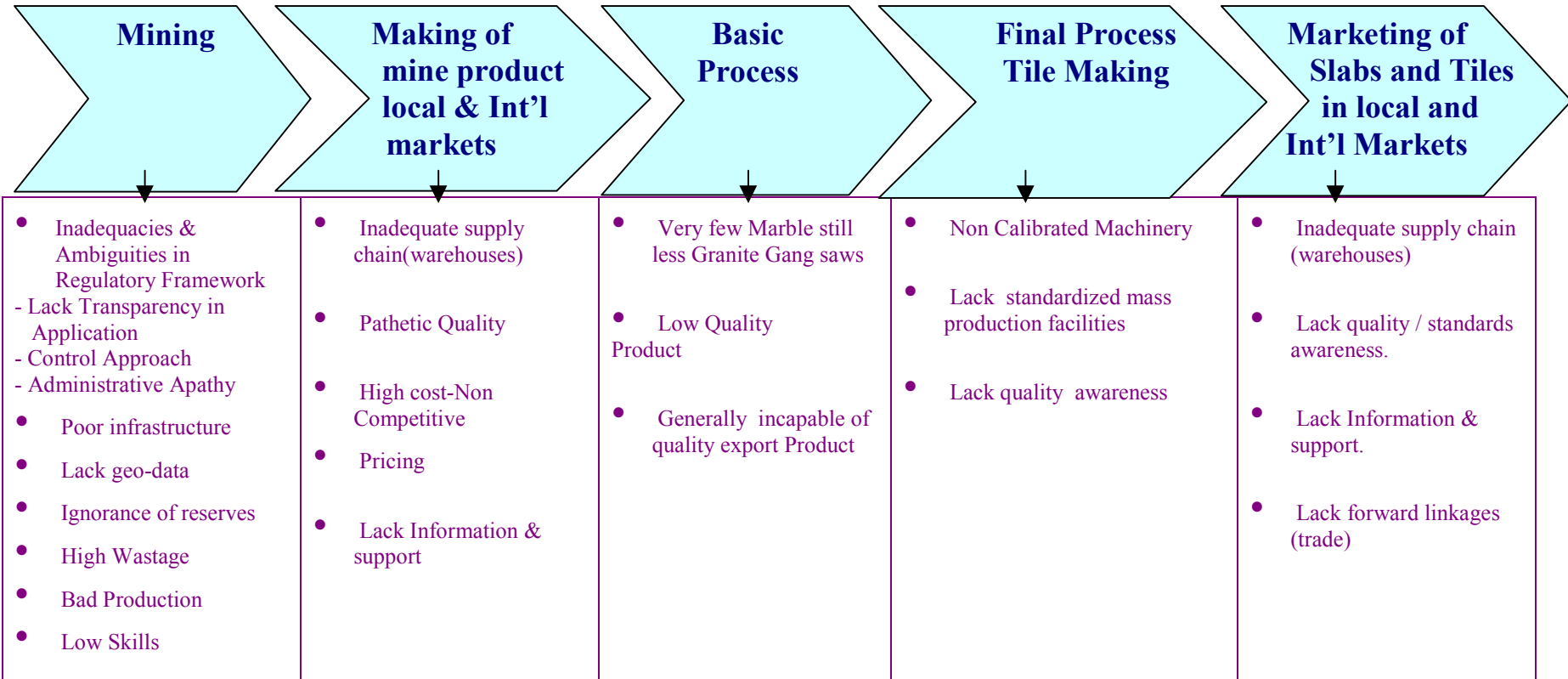
Baluchistan has nearly 60 operationalized mines. Total known reserves of marble in the province is around 2 million tons. The colors found in Baluchistan are widely accepted in the local markets and have the capability of international acceptance, due to their similarity with the Italian stones, which have widespread demand in the global markets. Baluchistan Onyx is favorite in the world markets and is used for facings, flooring and decorative items. Onyx mine in Baluchistan (Zehri mines in Chaghi Distt) is the only mine in the country properly equipped with modern mining machinery and quarrying is done on advanced methods. Proper survey of the deposits in the province has not been done hence actual reserves are not known. Baluchistan has total processing strength of three units.

### **5.2.3 Sind Contribution to the Sector**

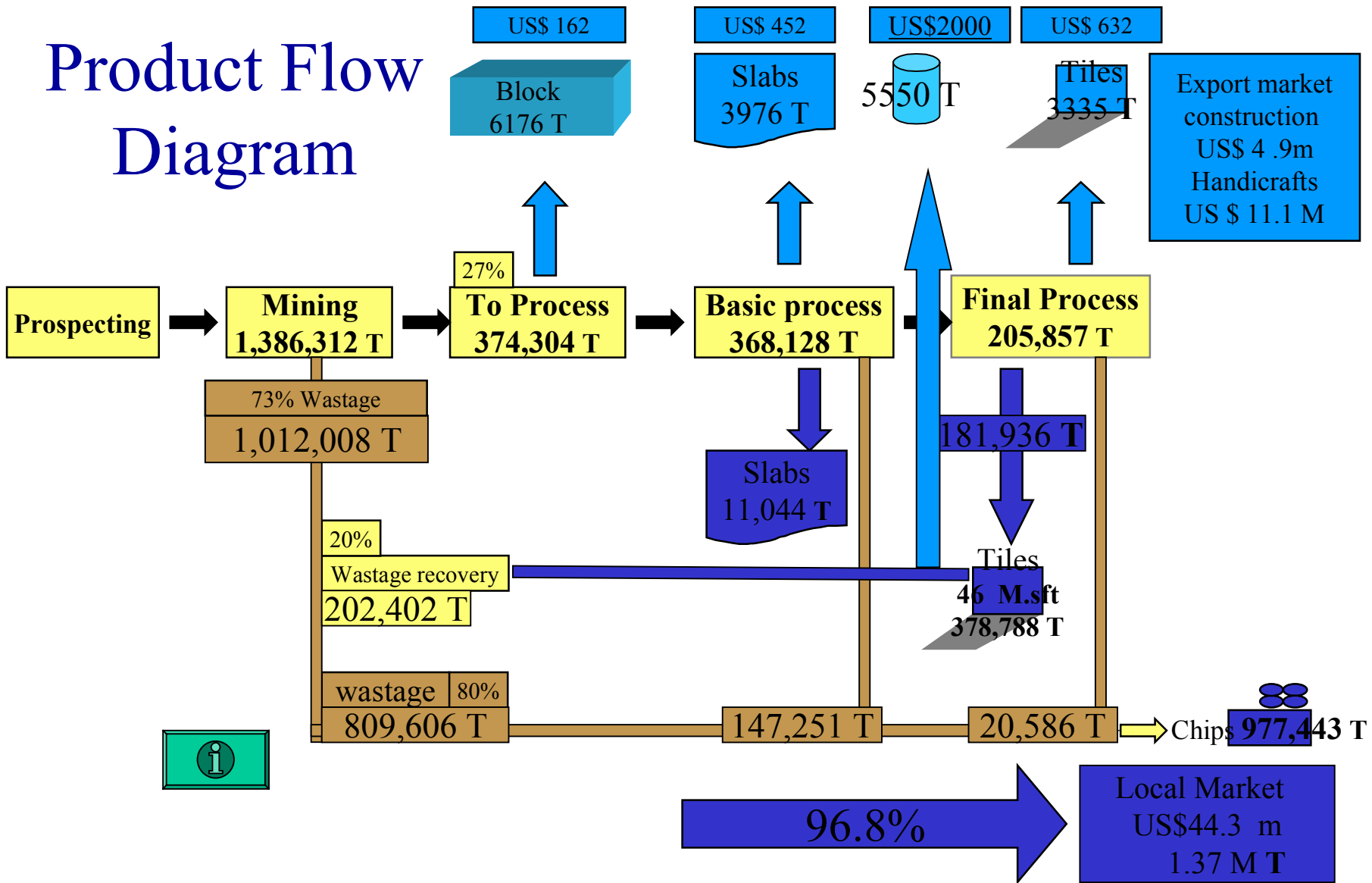
Sind also has good colors of granite widely spread in the area of Tharparker. There are 10 operationalized mines, while reserves are not known as no efforts in this direction has been made so far. The mines are producing blocks in squared shape and are supplied to feed the local industry. Sind granite can compete in the international markets with India, as the colors found in Sind are better than the colours found in India. There is a big cluster of processing units in Sind, at Karachi with over 180 medium size units. There are more than 600 units of small and micro size with 1-3 cutters in the unit, in addition to the above.

### **5.2.4 Punjab Contribution to the Sector**

In the quarry production Punjab has no contribution to the sector as there are no mines identified as yet, capable of producing marble and granite. There are however deposits of Slate and Limestone in the northern Punjab. Three significant sized clusters of processing units in the province exist at Lahore, Rawalpindi and Islamabad. Numbers of processing units in these cities are 93, 112 and 51 respectively. In addition there are smaller clusters in Multan, Faisalabad, Gujranwala, Sargodha, Sialkot and Gujrat.



# Product Flow Diagram

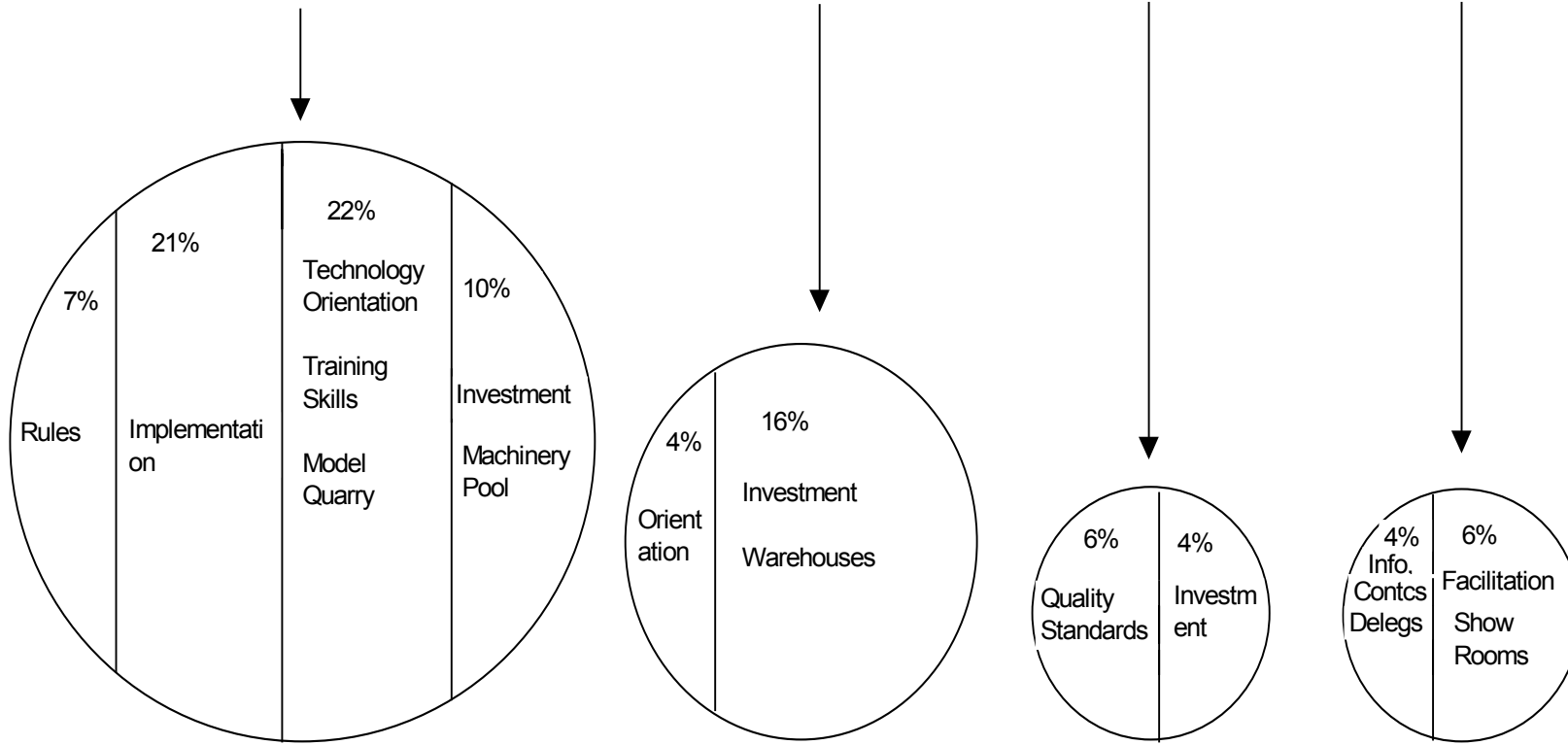


**MINING 60%**

**SUPPLY CHAIN 20%**

**PROCESSING 10%**

**EXPORT 10%**



## Value Chain

## 5.4 Marble and Granite Leases and Reserves in the Country

Little efforts were made in the past to identify and estimate Marble & Granite reserves in the country. Some of the reserves of Marble & Granite were however calculated with the efforts made by development projects and concerned departments. The reserves estimate may not provide true picture of the overall quantum but for our understanding this may help in providing preliminary base for decision making.

According to an estimates there are 160.2 million tons of Marble reserve in the country.<sup>1</sup> Share of NWFP in the above figure is 98.5 % while that of Baluchistan is 1%. Proper survey can reveal more reserves. Granite reserves at only one place in Northern Areas show a total of 414 million tons<sup>2</sup> while other reserves of Granite are spread all over the NWFP, Baluchistan and Sind. Even the identified reserves are sufficient for more than 100 years.

Table 8

Reserves and Leases of Marble and Granite in the Country

	No of Leases			Leased Area			Reserves in Million Tons	
	PL	ML	Total	ML	PL	Total	Marble	Granite
NWFP	124	156	280	80789	34438	115227	157.9	N.A
Baluchistan	-	-	203	-	-	104139	2.2	N.A
Sind	-	-	N.A	-	-	N.A	N.A	N.A
Punjab	-	-	-	-	-	-	-	-
Northern Areas	-	-	-	-	-	-	N.A	4140
FATA	4	4	8	5620	3976	9596	0.1	-
<b>Total</b>	<b>128</b>	<b>160</b>	<b>491</b>	<b>86409</b>	<b>38414</b>	<b>228962</b>	<b>160.2</b>	<b>4140</b>

(Source: DIMD, Baluchistan/ NWFP)

## 5.5 Regulatory Frame Work

Regulatory regime plays a pivotal role in the mineral extraction. According to the state rule all minerals are the property of the state<sup>3</sup> leased to the investors under contractual arrangements with the Government of Pakistan. Surface under which mineral exist is the property of the local people, either individuals or families. This has always been a grave issue both in the tribal and settled areas of the country. To address this issue many regulatory step have been taken from time to time but are not being solved to date as per satisfaction of the lease holders and owners of the property. In addition to this there are many other issues creating hindrance in the smooth mining operations. Lease holders of dimensional stones in particular are shy in investing in the mine for better technology leading towards extraction of blocks due to lack of security of tenure. Key issues of the regulatory regime are given in below.

### 5.5.1 Processing of Applications.

<sup>1</sup> DIMD ( NWFP)

<sup>2</sup> 2<sup>nd</sup> Segmite Int.Conf 1994 pp35-43

<sup>3</sup> Mining and Concession Rules 1976/ National Mineral Policy 1995

Timely processing of applications for Prospecting License and Mining License by the Directorate of Industries and Mineral Development (DIMD) is a contentious issue and at times it takes more than six months to process an application and make decision.

**a. Prioritization of Applications.**

In NWFP (S.15) there is an acknowledged pattern of treating applications on a "first come, first served" but as such does not guarantee grant of lease as discretionary powers are rested with the directorate

**b. Renewal of Application.**

Discretionary powers for issuance of the license have been vested in DIMD in all the provinces for renewal of P/L & M/L. It is stated that if the applicant is "considered fit" (Punjab, S.30 Sind S.29) or if "it is not expedient to grant, it will be refused" (NWFP S.17, Baluchistan s.18). These subjective statements leave the system non-transparent

**c. Submission of Work Plan.**

Progressive mining regimes all over the world require mandatory submission of work plans prior to commencement of exploration/ mining works and the same are followed in letter and spirit in terms of investments, technology/ mapping and mine face development etc. While the same is required in the mineral rules-76, six months after grant of license

### **5.5.2 Security of Tenure: -**

The single or most grave concern to the mining investor is the insecurity of mining tenure implied at various places within the rules. The leaseholder will want to see provision of Security of Tenure in the mining law before making any worthwhile investment. The lease awarded for thirty years to the lessee can be cancelled with one stroke of pen at the discretion of relevant government department. There are some loose ends in the mining and concession rules allowing unprecedented powers with leasing authority that create chaos.

Incidentally in NWFP the rule states that duration of a mining lease is at the discretion of the Licensing authority.

### **5.5.3 Assignment/ Alienation of licenses**

Inclusion of third party is not possible under the present regulatory regime. These restrictions may cause problems for the companies making joint venture arrangements with another company once its exploration program becomes more costly or is designed for appropriate technology. Assignment of part of the license to second party is often in the best interests of the country (by attracting foreign investment). If a leaseholder or a company desires to assign his leased area or make Joint Venture with other person (s)/ Company will have to surrender that particular area and a new application to be initiated by both the parties.

### **5.5.4 Arbitration and Appeal procedures:**

Provision for arbitration and appeal is almost the same in all provinces with some minor variations. According to the rules appeal on the award/ cancellation of the lease is made to the relevant secretary of the provincial

government. His decision is final and binding. This seems discriminatory, as his office is playing the role of licensing authority.

### **5.5.5 Surface Rent and Local Interference:**

Surface rent for mining areas as a payment to the locals (normally malik / landowners) is decided and handled under a loosely managed regime. Some of the provinces state that this will be in accordance with the rent laws in force (Baluchistan and Sind). NWFP (S.17) rules states that it will be determined by the Licensing authority and shall be final and binding to all concerned. For all practical purposes implementation of such rules becomes unworkable and leads to serious disputes repeatedly between the leaseholder and the landowners (locals). Repeated hindrances by the locals severely effect, smooth running of the mining project and its productivity. Practically the rents are settled between the leaseholder and owner of the land under mutual understanding without involving government functionary.

It is important to have uniformity in all the provincial legislation. The loose ends need to be rephrased towards investment friendly, secured mining operations. It is also important from financing perspectives as the lending agencies will not finance the projects with in-secured mining leases and biased regulatory regime. In addition confidence of the private sector on government could be developed once their representative bodies are involved in decision making especially in the arbitration.

## **5.6 Mining and Production of the Dimensional Stone**

### **5.6.1 Mining**

Mining is done in the country on primitive techniques including uncontrolled blasting. In majority of the mines basic machinery and equipment like compressors, drill sets and lifters are not available. This not only lead to colossal wastage but also to low production at mines. Average production of the majority of mines is 10 tons a day mostly boulders, kanda and chowka. None of the mine owners and mining experts at mines knows the reserves, topography of the mine and chemical or geological analysis of the stone therein.

Mechanized exploration and mining involves steps like:

- Reconnaissance survey
- Detail survey
- Infrastructure Development
- Quarry designing
- Quarry Development/Benching

In almost all mine sites in the country the above steps are seldom followed. The reconnaissance and detailed survey results in proven reserves. Had these surveys been properly carried out, we would have known reserves of Marble and granite by now at least in the operational mines. Quarry designing need the services of experienced quarry master or mining engineers, whose services are hardly acquired by any of the existing miners. Quarry development, which produces proper benching at mines by using appropriate machinery and equipment is not seen any where on



the operational mines .By Investment and production our mines could be defined in their relative categories of micro, small as Medium sizes.

#### **a. Micro Size**

Micro level of mines are those with production of 3-5 tons per day using conventional hand tools and petrol operated drill machines for the extraction of stone. Handling of the blocks is done with the help of manual levers and in some cases with hand operated chain pulleys. Total capital cost of the machinery and tools in this category are around Rs. 60,000 to Rs.70, 000. Almost 83% of total mines (332) fall in this category.

#### **b. Small Size**

Small mines have capital investment between Rs.200,000 to 300,000. Mining machinery includes compressors, drilling equipment for mining and motorized wench for handling of the produce. These mines are around 14% of the total or 56 in number. Total production of these mines is 15-20 tons per day.

#### **c. Medium Size**

These mines comprised of 3 % of the total operationalized mining population or 12 in number in the country. Total investment in this category range from Rs.5,000,000 to Rs.15,000,000. Average production of these mines is 100 tons per day. These mine have a range of machinery that include Compressors (more than one), Drills and drilling tools, motorized winches. Among the handling machinery and equipment some of them have cranes, loaders and shovels etc.

### **5.6.2 Mine Development.**

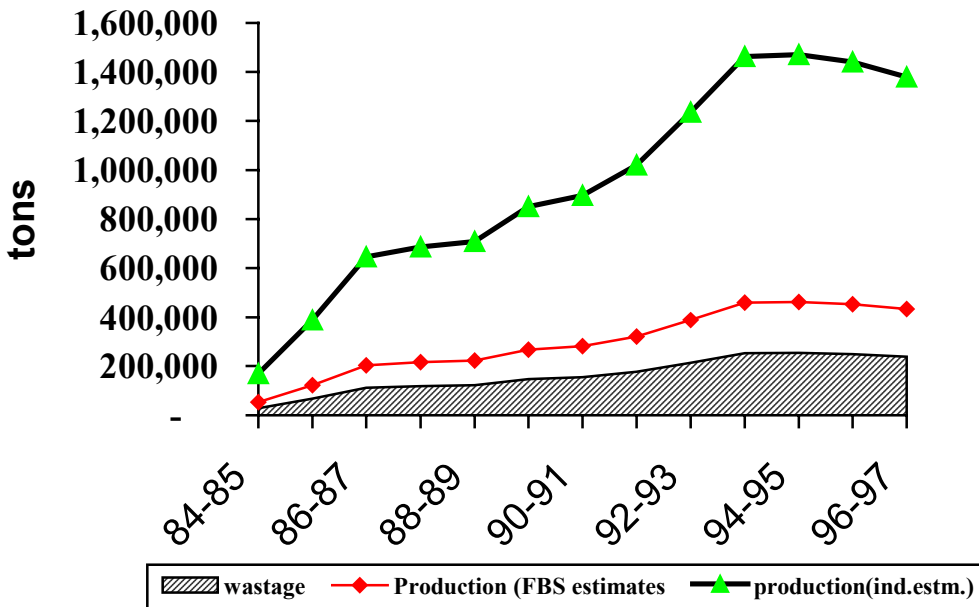
In addition to use of out dated and inappropriate machinery and equipment for extraction of stone, the miners are not used to carrying geological study in scientific lines to determine proper direction and required machinery, resultantly the miners face enormous losses on the mines in the initial stages of quarrying by opening the mine pits in the wrong direction and place. Most of them almost 98% can not sustain these losses and subsequently close their mines. There is lack of awareness among these potential miners about the benefit of the above technical practices. Even those who succeeded in the initial stage by trial and error have not done mining upto the mark. According to the mining concession rules 1976, the miners are required to carryout scientific practices but the rule are not properly implemented hence the situation on ground is different. Refraining from doing these desired practices the mining industry is constantly facing problems as follow:

1. Loss of upto 73% with poor quality of remaining product.
2. Destruction of valuable national resources through cracks
3. Ultimate closure due to opening of the mine face at inappropriate and in the wrong direction.
4. Reduction in the mine life as overburden of surface material on mine pit with reduced chances of carrying out further mining at that particular area.
5. Low productivity at mine due to unqualified staff at mines, and low technology.

### **5.6.3 Production**

Production of Marble in Pakistan Fig 5

000 TONS



While the official statistics reflect much less production of dimensional stone in the country<sup>2</sup> actual production estimates of the industry show a total production of 1,386,000 tons for 1997-98. The production has shown decrease of 5% over the production of the last year. In the nineties the sector showed an average growth of 18% up to mid of the decade where after in 1996 and 1997 the production started decreasing.

## 5.7 Marble and Granite Production/Deposits by Color.

### 5.7.1 Marble Colors.

Majority of the colors traded in the international markets are available in the country. Among all these colors white color is universal in demand. Following exhibit indicates the colors of marble and onyx in different parts of the country.

<sup>2</sup> DIMD (NWFP)

Exhibit 3

Major colors / shades available in the country

Major color categories	Names of Areas	Color Shades	Area-wise Production
White	Muhmand Agency, Chitral, Buner, Swat, Parachinar, Gilgit, Hunza, Swabi, MKD.	Pure White: White with pink, brown and green shades: White to light gray: White to gray with yellowish patches: White to light gray with yellowish brown patches: Creamy white	15000+9000+115000+24000+108000+12000=418000 Tons
Black	Buner, Bajour, Mardan, Bela	Deep Black: Blacks with patches of white: Black with white and golden streaks	12116+46000+84000+84000=226116 Tons
Green	Swat, Swabi, Buner, Azad Kashmir and Lasbela	Dark Green, Green with streak & patches of white, gray and black, Greenish white. Greenish gray	23000+12000+12000+4000=51000 Tons
Pink	Nowshera, Chitral, Bela Lasbela	Pink with streak and patches of white: Pink with patches of white, gray, red and brown: Pink with fossils	90000+3000+4000+56000=153000 Tons
Gray	Buner, Bajour, Mardan, Swat, Mohmand Agency, Lasbela and Khuzdar	Gray with white bands: Gray with pink, brown and green patches	207000+16734+143462+36000+14000=317196 Tons
Brown	Buner, Swat, Kohat, Waziristan, Khuzdar and Lasbela	Dark Brown with white lines, Brown with yellow patches, Light brown with fossils.	23000+4000+24000+14000=65000 Tons
Yellow	Buner, Kohat, Lasbela, Khuzdar	Yellow with Golden patches: Yellowish golden with fossils.	46000+48000+42000=136000 Tons
<b>Onyx</b>			
Green		Dark green with layers of light green: Green with streaks of white and yellow	14000+6000=20000 Tons
White, Brown banded		White with layers of light gray	6000 Tons
<b>T. Production</b>			<b>1386312 Tons</b>

(Source: Industry and market research)

## 5.7.2 Granite Colors.

Pakistan fortunately has exceptionally good shades and colours of granite widely available in different parts of the country. Rare colours have great demand in the world market These include, Jet black, Pearl Blue, and Dark Green. In the following exhibit colours of granite and their availability in different parts of the country is mentioned.

Exhibit 4

Major Colours and shades of Granite available in the Country

Major Colour Categories	Name of Areas	Colour Shades
Black	Mansehra, Gilgit, Dir, Swabi, Kohistan, Chitral	Jet black
Pink	Dir, Swat, Nagar Parkar, Kohistan	Pink
Grey	Gilgit, Dir, Mansehra, Buner, Malakand, Chaghi	Silver lining grey: Greyish Green
Green	Chaghi, Dir, Swat, Kashmir	Green with golden bends
Gold and Yellow	Kohistan, Swat Dir, Mansehra,	Golden Yellow
White	Gilgit, Baltistan, MKD, Dir, Chitral	White
Red	Dir, Swat, Kohistan	

(Source: Industry and Market research)

## 5.8 Processing Industry

Processing industry for dimensional stone in Pakistan started to develop in late sixties with housing construction and industrial activity picking up most of the product without any quality consideration. Most of the processing equipment were locally, made at Gujranwala and Lahore. Some processing units established at Karachi during this period were founded by Muslim settlers from Makrana (South India). These people had a history of working the stone and they continued to improve the processing with the help of modification and improvements in local technology.

While mid seventies brought imported plants from Italy. Initially, the plants were second generation machines that were barely good enough to cut slabs and tiles at high speed but they had no quality consideration and the market had still not pressed for competitive quality. During late seventies a few large projects and wealthy private housing clients brought imported granite tiles and introduced quality to this market and at the same time large housing project started to come up in the private sector coupled with increased architecture sophistication in private housing.

Very few units, about eight, with complete range of machinery and equipment capable of processing stone in accordance with international standards were established in the last decade. Utilization of these units is nearly half of their installed capacity due to inappropriate raw material. Irregular blocks occupy total space available at the first step of processing with 50% production potential because of its shape. Other associated costs, includes; additional electricity charges, time, labor, additional wear and tear etc. Loss on profitability on the squared block processing is around 300% because of the irregular shape of block (details are available in **annexure**). Majority of the processing units, lack appropriate machinery resulting into low quality products. There are only about 25 to 30 units which have all appropriate machines, rest of the small and medium units use inappropriate machinery to do one of the sequential activity, either of cutting slabs sections or cross cutting.

The industry as a whole is miles away from producing quality products due to the following reasons.

- a. lack of proper machinery to produce quality product
- b. Lack of awareness and facilitation in selecting appropriate tools for different stone.
- c. untrained workers
- d. non existence of quality control practices
- e. poor raw material supply
- f. lack of distribution channels including raw material and finished goods warehousing
- g. incapability in supplying consistent product

There is no institutional arrangement aimed at developing human resource in the industry. Raw hand labors is inducted in the factories and are trained on the job through trial and error mechanism. These units are not supply efficient and there are missing links with in industry from raw material source to these units and to showrooms. The established network of the warehouses can at least ensure the supply of material to the processing units and products to the exporter.

Table 9

Marble and Granite Processing Industry in Pakistan

Name of City	Total No of Units	Gang Saw	Gang Saw	Gang saw	Cutters	Cutters	Cutters	Auto Polishers	Manual Polisher	Chip Tiles
		Import	Local	Mini	H.V	48"	12" to 36"			
KARACHI	180	14	16	1	20	-	630	3	300	36
HYDERABAD	6						10		2	

QUETTA	3		1				9			
MULTAN	35						49		5	
FAISALABAD	28					2	53		2	
SARGODHA	6						10			
LAHORE	93	2	2	-		3	200		19	2
GURANWALA	11	1				1	20	2	2	1
SIALKOT	6						8			
GUJRAT	6					1	11			
RAWALPINDI	112		15	4	1	10	165		4	
ISLAMABAD	51	2	23	4	3	5	200		18	4
N.W.F.P.& FATA	148	3	46		21	70	850	7	33	2
TOTAL	685	22	103	9	45	92	2215	12	385	45

### 5.8.1 Marble Processing in Pakistan

Marble is processed in more than 1600 units in the country including 685 small and medium size units. These units have been defined in three categories according to their sizes;

#### a. Micro Units

These units have a maximum investment of up to Rs. 1,000,000 with the machinery set up including 1-3 cutters. All the machinery employed is locally manufactured causing undesired variations in tiles cutting. Boulders of marble are usually cut on these machine aimed at cutting small tiles measuring 6x12 inches, 6x6 inches and 6x4 inches or other small sizes desired by the customer. There are over 1000 micro units in the country with the average production of 2000 square feet in a month by each unit.

#### b. Small Size Units

In this category all units having investment ranging between Rs.1,100,000 to Rs.5,000,000 are included. There is total strength of around 677 units of this size in the country with average production of 8000 to 9000 square feet in a month by each of these units. These units are capable of producing comparatively larger sheets 12x24 inches 12x12 inches, and other small sizes.

#### c. Medium Size Units

Medium size units are having total investment ranging between Rs.51, 00,000 to Rs. 20,00,0000. There are around 10 to 13 units falling in this category in the country. These units process marble blocks for tiles as well as slabs. A complete range of processing machinery including gang saw (for slab cutting), block cutters, cross cutting machines, Chamfering machine for side cutting and multiple head auto polishers are available in these units. These units with total strength of eight in number are capable of processing tiles of international specification. Production capacity of these units on the average is 20,000 square feet per month per unit. The products vary in sizes and could be as large as 3x 5 feet in size. Sheets larger than 3x5 feet could be obtained by feeding raw material in squared block in the production lines.

## 5.8.2 Granite Processing in Pakistan

Unfortunately processing strength for granite in the country is pathetic. We have only nine units so far with four of them operational. The other five units are closed due to financial constraints. All of these units have an average investment of over Rs.20 million with gang saws, block cutters and polishing heads. Due to hardness of granite, production capacity of granite processing units is low as compared to marble. Average production of these units is 6000 to 8000 squared feet in a month per unit.

## 5.9 Quality problems

Most of the units with good quality of machinery set up are even unable to produce high quality products because of substandard raw material and low quality skill level of the production workers. International buyers allow variation of 0.5mm for tile and 1.0mm for slab. Prevailing industry average variations are too high and do not conform to the international standards. In addition to the above there are many other factors associated with low quality output by the processing units.

1. Input of bad quality raw material. As discussed earlier irregular blocks hardly result into good quality of output.
2. Lack of machinery and equipment in most of the processing units. To cater for the export markets. Majority of the processing units needs to add essential equipment that is missing in the production line. These items vary from unit to unit. A comprehensive list of appropriate processing set up is given in [annexure](#) for reference.
3. Lack of skilled workers.
4. Lack of the use of calibration instruments, for quality checks during the whole production process.
5. No use of standard cutting tools according to the specifications and composition of the stones.
6. Lack of qualified engineers and professional managers in the processing units.

## 5.10 Productivity and yield

Productivity of the mining sites and processing units is highly dependent on the usage of appropriate technology and supply of desired raw material. In the prevailing circumstances desired level of productivity at the processing end can not be achieved as the shape of stone restricts high yields. Irregular blocks, commonly referred to as “Potato blocks” have the inherent disadvantage at the saw load in addition to latent cracks etc. It occupies space, which could otherwise be utilized for almost two squared blocks. With potato blocks only 400 tons of stone load can be processed compared to 912 tons of squared blocks in a month.<sup>1</sup> Time spent on cutting the undesired portion of the stone is an additional problem. With uneven block 60-70 square feet of the finished product is achieved per ton while square block produces about 110 to 120 square feet per ton (see [annexure](#)), while keeping thickness of the tiles as constant at 1 inch. Average processing loss in international processing industry is 40 percent while

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<sup>1</sup> Industry estimates and own research

processing loss at our processing units is between than 52 to 55 percent (see [annexure](#)). While losses increase wear and tear of machinery and most importantly lower value of product make a rather strong impact on low productivity.



## 5.11 Institutional Efforts

There is an association of miners in the country with provincial chapters. The association is poorly organized with ambiguous mission. Election of the office bearer is not done regularly. Collection of membership fee for meeting expenditure is not in practice.

## 5.12 SWOT Analysis

Following exhibit indicates strengths, weaknesses, opportunity and threats in the Marble and Granite sector

Exhibit 5

Strength, Weaknesses Opportunities and Threats in the Marble and Granite Sector

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>- Large deposits of superior quality Marble and Granite in Country.</li> <li>- Variety of types and colors.</li> <li>- General accessibility to major M&amp;G deposits.</li> <li>- Significant number of Mines and Processing Units.</li> <li>- Hard working &amp; Low-cost Mining Labor.</li> <li>- Traditional Regional Trading Pockets.</li> <li>- Culturally accustomed Informal Trade Houses.</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>- Inappropriate regulatory Environment.</li> <li>- Distrust, Apathy &amp; Control orientation of Regulators.</li> <li>- Uncertainty of Policy &amp; Fear on Unknown.</li> <li>- Inadequate infrastructure, critically low on mines.</li> <li>- Low investment &amp; pathetic Capitalization.</li> <li>- Low mining skills &amp; Technology.</li> <li>- Non-existing Supply Chain &amp; Weak Processing Base.</li> <li>- Lack Product Awareness &amp; Quality Appreciation.</li> <li>- Low Marketing efforts &amp; Trade Support.</li> </ul>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>- Large &amp; Established World markets.</li> <li>- Comparative Closeness to International Mkt.</li> <li>- New trends of Granite usage Internationally.</li> <li>- Rehabilitation in Afghanistan &amp; CAR Countries.</li> <li>- Increased strategic focus on sectoral exports.</li> <li>- Improved awareness &amp; availability of local stone.</li> <li>- Proposed changes in Regulatory environment for Private Sector facilitation.</li> <li>- Institutionalization of Support efforts by Govt.</li> <li>- Quality Standard Implementation.</li> <li>- Improved Handling/Transportation Technologies.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>- Political instability &amp; bad governance.</li> <li>- Frequent &amp; untenable Policy Changes.</li> <li>- Trade Boycotts or Financial meltdown.</li> <li>- Schedule of Implementation for trade protocols (ISO 9000 etc.).</li> <li>- Unavailability of stable &amp; economic utilities (Power, Fuel and Electronic).</li> <li>- Unmanageable Environmental degradations and Loss of Life.</li> <li>- Unsustainable destruction of Mineral Wealth and National Loss.</li> <li>- Critical loss of development opportunities in backward areas.</li> <li>- Entrepreneurial losses and International un-compatitiveness.</li> </ul>

## Chapter 6

### Marketing of Dimensional Stone

Customers for dimensional stone and marble tiles can be classified into upper, upper middle & middle classes. According to usage the segments can also be classified as, households, offices, buildings etc. The use of marble and granite can be for external and internal facing, flooring, stairs, structural works, special works and others. Around 46.1 million square feet of tiles weighing 384,338 tons, 11,044 tons of slabs and 977,443-ton chips were consumed in the local market in 1997.<sup>1</sup> Total worth of the locally consumed material is \$44.3 million. In the domestic market, the marble tiles are laid with cement sand mixture, therefore non-uniformity in the thickness of the tile is tolerable.

#### 6.1 Target Market.

The target market can be divided into two groups.

- a. Domestic market
- b. International market

##### 6.1.1 Domestic Market

According to the industry estimates only 20% of the newly constructed houses are using marble and granite products. Another 30% have the potential of using M&G products but are using alternative products including ceramics tiles and marble chips etc mainly due to lack of proper promotion of the M&G products. Annual demand of housing in the urban areas in the country stands at 0.4 million units<sup>2</sup>. Out of this total 20% would be marble consumers while 30 % will have potential for consuming marble and granite products. In total 0.2 million housing units become target market with approximately 500 square feet of M&G product demand for each unit. A domestic market for about 100 million square feet of marble and granite therefore exists. Existing consumption of around 46 million square feet is less than half of the total potential. This gap is being filled with alternate products that include ceramic/ vinyl tiles and marble chips.

##### 6.1.2 Export Market

Pakistan is currently exporting nearly 13 thousand tons of construction stones (raw blocks, slabs, and tiles) valued at nearly US \$ 4.9 million, in addition to the \$ 11 million exports of marble/ onyx made ups. Major importing countries of construction stone from Pakistan are Bangladesh, USA, Hong Kong, Italy and Lebanon. Key importing countries of Onyx are South Korea, USA, Japan, UK and other European countries.

#### 6.2 Distribution System

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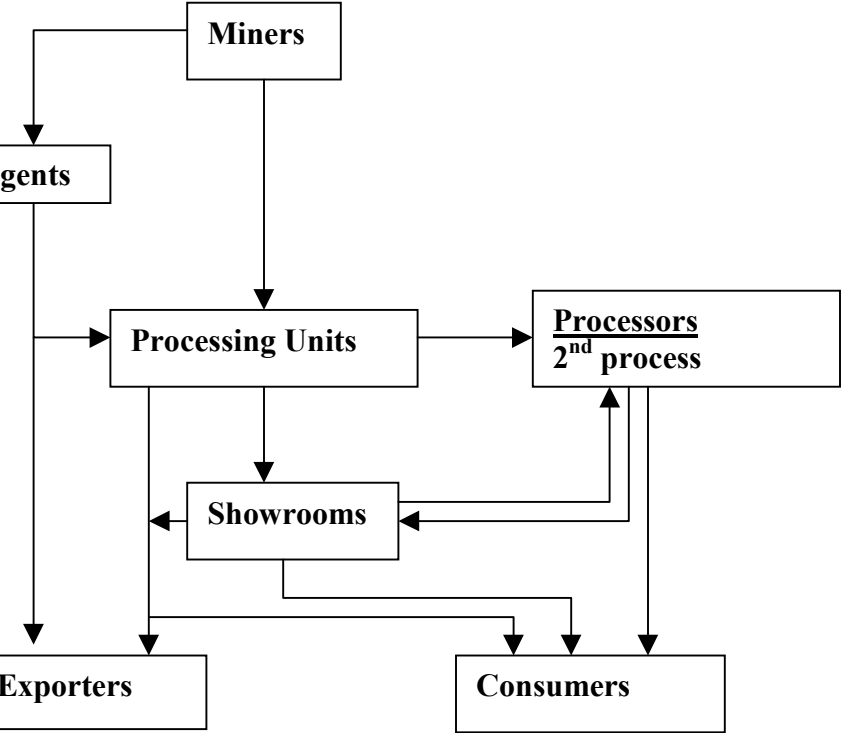
<sup>1</sup> own data processing on 1997 production figures

<sup>2</sup> Economic Survey of Pakistan 1996-97

2

Existing distribution system in the county for marble and granite is quite distorted. Mine owners can not ensure consistent supplies of the mined products to the processors, whether local or foreign. Similarly processors or agents have no such arrangements to commit bulk supply for a given color of stone. In the international distribution arrangements, material warehouses and stock compounds is the norm in the industry. For comparison both local as well as international distribution systems are explained in detail.

### 6.2.1 Local distribution system



## **A. Mine products**

Large blocks/ Small blocks/ Boulders/ Chowka/ Kanda (Described earlier in Chapter 2)

### **Buyers**

#### **a. Processing units**

Processing units purchase raw material directly from the mines either through their agents or by placing an order directly on the miners. Orders are normally placed by the processors after confirming quantitative demand by the customers (showrooms/ household) for selected color or shade. Material is shipped through trucks (miner owned or hired) to the processor at the processor's cost. Other costs including district tax/ toll/ Octroi etc are also paid by the processors. In addition the processors also pay substantial reward to the truckers for the timely supply of the material and confirmed delivery of the desired color of stone.

#### **b. Agents (middlemen)**

They are independent agents involved in the supply of material to different processing units and exporters. They are in constant search for exploring new shades/ colors and identify new mines. Some of them however invest in the material and sell it for higher prices to the more needy processors.

#### **c. Exporters**

They could be the miners, the agents or an outside trader who deals only in the export and purchases the material directly from the miners. The exporters have their own compounds where the stock is kept and squared with manual labor. However very few such warehouses exist in the country

## **B. Semi Processed products**

Semi processed products include slabs and unpolished tiles. Slabs have a market with the processing units/ showrooms, exporters and at the consumer site. At the processing units slabs are cut to desired sizes, polished and sold either to showrooms or to the consumer. Showrooms get them process (2<sup>nd</sup> process) according to the customer's requirement.

## **C. Processed tiles**

Processed tiles are routed by the processors through following channels.

- (a) Exported to foreign markets
- (b) Sold to the showrooms (either owned by the processors or by third party)
- (c) Sold to the household / projects
- (d) Sold to exporters upon placement of an order.

In none of the above channel inventory of more than 3000 square feet of the same color is maintained. Therefore neither the processor nor the showroom owner or exporter can commit to meet bulk orders of same colors to the international or local buyers. In order to meet this situation, international practices, in addition to efficient production by miners and processors are

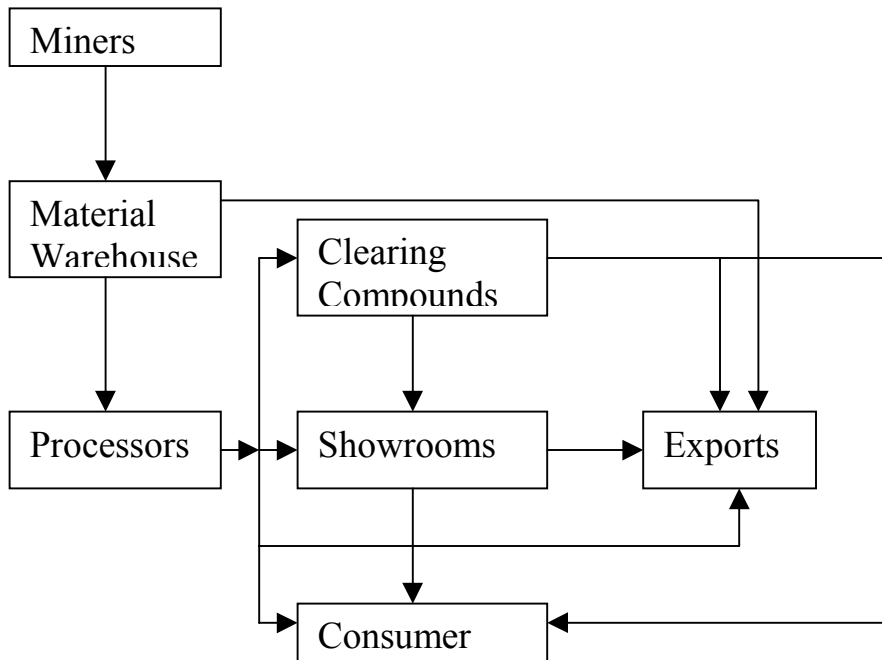
**i. Marketing Cartels**

Few companies join hands in the efforts of making supplies against given orders.

**ii. Warehousing compounds**

Material both from miners and processing units are stocked in bulk by the third party for onward sale to the processing buyers.

**6.2.2 International distribution practices**



# Chapter 7

## Proposed Program Components

Based upon analysis of data and information gathered from secondary and primary sources and review with the industry experts from different areas a comprehensive sector development plan has been prepared. The plan has six major components supported by number of related activities.

These include:

1. Progressive marketing strategy
2. Technology upgradation , Productivity at mines and at Processing units
3. Technology oriented financial package
4. Investor friendly regulatory framework and fiscal regime
5. Institutional development program
6. Infrastructure facilities

All of these program components are described in detail as follows.

### 7.1 Marketing Strategy

#### 7.1.1 Target Marketing

Identify and concentrate on the market segments, which have greater demand, and select products in which we have competitive strengths like resource availability and or processing capability/know-how etc.

Based upon this strategy, following markets and products have been identified:

#### 7.1.2 Export Markets

After a thorough review of the previous chapters on the world market, it has been found that major usage of dimensional stone is in the construction industry. Raw and intermediate products have the biggest market in Europe and Asia followed by potential market for finished products, in the Middle East:

- **Raw and intermediate product**

- Far East (Taiwan, China, Japan, Hong Kong)

- Europe (Italy and Germany)

- Middle East (Lebanon)

- **Finished Marble goods**

- Middle East (Saudi Arabia & UAE etc)

Out of the world exchange of 18.4 million tons of marble and granite six countries, viz., Italy, Germany, Lebanon, UAE, Japan and Taiwan play dominating role with 6.5 million tons and 35 % of the world exchange. In addition to quantitative exchange, market proximity will provide the comparative edge in these target markets for our products

especially in the case of Middle East markets. Among these countries 62 % share is for raw granite 28% is for raw marble and 10 % share is for the finished products. With view to their import requirement it is not difficult to get only 2% share in these markets which will take our exports to \$ 40 million. Taiwan, Lebanon and Italy are major importers of raw marble while Japan, Taiwan and Germany are considered for the export of raw granite. In the finished product category Japan, Germany and Middle East Markets (including UAE, Saudi Arabia) are focused for the export of finished tiles of marble. Exports of granite raw blocks are included in the plan. Low strengths in granite due to limited number of units, we have not focused on value added finished products export in the prevailing circumstances. The situation may be reviewed after the industry gains due strength.

### **7.1.3 Market Outreach Methodology**

Following measure are being proposed as entry points in the target market.

- ◆ **Identify and contact importers / buying houses in the target market.**

The process of identification and contacts is already in process in collaboration with UNIDO, Marble and Granite Associations of Pakistan and Foreign Missions.

- ◆ **Contact Foreign Trade Councils and Industry Associations**

Contacts are being developed with the foreign trade councils through EPB, chambers and Foreign mission. This will help in finding import opportunities in the target countries.

- **Trade Exhibitions**

Trade fair and Exhibitions are an important mode of increasing awareness of new products, modern systems and practices in the industry. In addition these activities open avenues for marketing. An exhibition of marble and granite is being arranged with EPB at Peshawar in the 1<sup>st</sup> week of April 2000 .The same experience will be followed, by at least one exhibition every year in different parts of the country and the same will be promoted internationally. In addition to this entrepreneurs will be motivated to participate in the international exhibition so that our product is introduced abroad.

### **Information Warehouse**

The study highlights the needs for providing crucial marketing resource information to industry through establishing an information warehouse in private sector. SMEDA will facilitate coordination between the service providers and industry. The information warehouse will provide necessary information to all actors of Marble and Granite (M&G) industry of Pakistan. It is being assumed that with the passage of time a number of these centers will be established as part of the Marble & Granite sector Development plan. Detailed work plan for information warehouse is given in the [annexure](#).

## 7.1.4 Promotional Activities

### \* **Product Leaflets for Different Stones**

Leaflets of 16 different marble and granite samples will be designed, produced and marketed in the first six months of Implementation phase. Stones have been selected based upon greater marketing potential, with special emphasis on their export orientation and their prospective availability.

SMEDA has selected the stones in consultation with the industry. The stones have been procured from their original sources, tested and analyzed by an independent Mineral Testing Laboratory and have obtained the results of these tests in the form of, geological, mineralogical and Engineering data.

The pictures of these stones will be produced on the face of paper in a true to life form, while technical data will be printed at the back of the paper. The specifications of these leaflets along with cost and repayment are described in detail in the [annexure](#).

### \* **Pakistan Marble and Granite Industry Trade Directory:**

An international standard trade directory of Pakistan marble and granite industry will be developed. This directory will be developed and produced by an independent enterprise in the private sector with the help and assistance of all the concerned Associations of industry under the auspices of SMEDA. Details of this directory including costing of the directory and modes of financing are discussed in the [annexure](#).

### \* **Development and Dissemination of supply / Demand database.**

Supply/Demand database will be developed including source and user identification. The database will be developed in collaboration with chambers, associations and export promotion councils. This database will be computerized and available to all those who require it through Internet, fax, or e-mail.



### \* **Website development**

In line with international standards it is proposed to develop a marble and granite sector Website. This will provide latest information on Pakistan stone industry including, miners, processors etc. Complete technical and financial proposals have been developed with assistance of two private parties as annexed and more will be done if required.

## **7.1.5 Marketing Facilitation**

### \* **Trade delegation**

Trade delegations to international destinations/trade fairs, and exhibitions are proposed to be arranged every year. Exporters and manufactures will be contacted and their linkages with the Industrial associations/ exhibitors will be facilitated by SMEDA for the display of their products in these occasions. Awareness regarding the new technology and understanding of the market will be developed. Pakistani products (Marble and Granite tiles, sheets, and madeups) will be introduced in the international market through such exhibitions/fairs. This is a cost-effective mode of marketing of products with broader coverage. This activity is proposed to be financed by EPB through Export Development Fund (EDF).

### \* **Developing Local Trade Houses**

Selected few promising manufacturers and traders will be encouraged to develop local trade houses from amongst the industry at Peshawar / Islamabad and Karachi, where products from different Pakistani manufacturers will be sold. Different interventions will be required to develop the existing and nascent setups including provision of market information awareness of international standards and trade facilitation and linkages etc. they will be required to acquire warehouses and display facilities in the selected markets. Commerce Ministry will be requested to give them incentive up to 2% of export proceeds for establishing these facilities.

#### 1. Existing M & G blocks and Tiles exporters.

They will be facilitated in, market information including buyers addresses in the importing countries, exhibition calendars and sponsors addresses, arrangements of their participation in the exhibitions.

#### 2. Existing M & G blocks and tiles Manufacturers

They need to be facilitated in, providing market information including buyers addresses, market exposures, participation in international exhibitions as well as export procedures through EPB and other relevant offices.

#### 3. Existing Ceramic tile Exporter

In addition to the interventions in the above two categories they will be facilitated in information on the local market including block suppliers, processing units tiles suppliers and stone identification.

#### 4. Existing Marble decorative and hardware exporters

This category of exporters will be facilitated in providing market information including all interventions mentioned earlier. They will also be facilitated with information on suppliers of these products within the country.

### \* **Distribution Channel**

Considering the critical weakness of distribution system following measures are being suggested.

### \* **Material Ware Houses and Clearing Compounds for exports**

In order to streamline the supply of raw material and finished goods and ensure continuous availability of the consistent products, a chain of warehouses is planned in the country. Based upon our estimated export requirements of approx. 145,000 tons, it is suggested to have 13 warehouses each with 10 to 12000 tons by the end of three years period. These can be located in 9 different locations in the country, in the initial stage. The number will be increased subsequently depending on market demand and entry of the potential investors. This will be a purely private initiative with the status of Direct/Indirect exporters and will avail the facility of export refinance by the banks as per trade policy 98, announced by the Government. Cost benefit analysis of these warehouses is given in the [annexure](#).

### \* **Warehousing facility in the Target Markets.**

These warehouses will be established in the target markets that will facilitate availability of various types of dimensional stone in the foreign markets. This will be a private initiative.

### \* **Syndicate warehouses**

Presently it is being proposed that syndicated warehouses be developed for small clusters of units to take advantage of local opportunities like large scale housing schemes and construction projects like Airports etc. these warehouses will reimburse small processors and carry inventories through commercial banking facilities offered by NCBs/DFIs at 70% value of pledged stock.

### • **Freight and Shipping Facilities for Bulk Semi finished exports**

Low value heavy products of blocks and slabs incurring heavy transportation costs locally as well as on shipping. In line with practices of India and China we need to support inland freight. For this purpose bulk shipment from dry ports or otherwise of Peshawar, Islamabad, Dalbandin and Khuzdar are to be exempted further inland transportation cost up to Karachi for three years. These costs could be picked up from EDF and royalty proceeds.

### \* **Local Marketing of Marble & Granite**

Marble and Granite products shall be promoted among the local Architects, Engineers and Construction Companies. This would increase the local market for Marble and Granite products, which in turn would benefit the sector.

## 7.2 Productivity

Productivity both at the mining and processing ends needs to be improved in quantitative and qualitative terms. Our mining practices are not geared to producing raw products according to the international standard resulting into, quarry losses, processing inefficiencies, low value product etc. Processing units lack quality in production due to numerous factors, already discussed earlier. For making them efficient we need to initiate interventions focused on balancing and modernization of machinery equipment on scientific lines, in addition, inducting new technology on one hand and human resource development on the other. Skill development and quality orientation in all functional areas in the value chain of the sector is badly needed. To achieve this, following efforts are planned.

### 7.2.1 Technology Upgradation:

It is proposed that technology up gradation should be taken up through different modes as follows:

- Support to the Local manufacturers of machinery for developing, drawing of the machinery they manufactures, mainly through reverse engineering. To achieve this linkages have been initiated with Engineering Universities, existing machinery manufacturers, and qualified entrepreneur involved in fabrication of machinery and tools.
- Balancing and calibration of the existing machinery at the M&G processing units.
- Induction of new machinery with assistance of technical back up from machinery suppliers (in the case of imported machinery).

Planned activities in these areas have been started with request to various technology suppliers for soliciting interest.

### 7.2.2 Model Quarry Development

Model quarries at five different locations in the mineral bearing areas in Baluchistan (2 MQs) and NWFP (3MQs) are planned. The quarries will have complete range of mining and handling machinery and equipment, operated initially by the expatriate quarry masters who will provide training of trainers (TOT) to the locals, preferably mining engineers. This process will be continued, as the trained engineers will further provide training to the coming batch. Cost of the expatriate trainer is expected to be borne by the promotional development projects. This has been discussed with one of these projects which has shown interest in funding the activity. These model quarries will be owned and managed by private sector. Details in terms of costs/ benefits are given in [annexure](#).

### 7.2.3 Training Institute for Processing Technology

Two Training institutes, one in the NWFP or Islamabad and one at Karachi are proposed. These institutes will have modern machinery and equipment and will provide training on processing technology. This will be operated and managed by local entrepreneur. Details of the training institute are provided in the [annexure](#). The total cost of the training institutes is approximately Rs 25 million each and the same can be met from private sector (bank financing) while government may support through provision of land.

## **7.2.4 Best Practices Exposure**

Progressive miners orientation to mine development for benching and extraction of square blocks will be carried out simultaneously with the training programme to attract miners to participate in proposed short term (two weeks) and long term (six months) training programmes. Similar program will be designed for the processor to promote high quality production. The best practices exposure involve following activities;

- 1- Identification of Miners and Group formation
- 2- Audiovisual Orientation at SMEDA and at Sites.
- 3- Visits to and Contacts with Machinery Suppliers for Technology.
- 4- Arrangements with Foreign Miners in China, Turkey, Italy & Spain for Site visits.
- 5- Visits to Processing Units / Association for Marketing

## **7.2.5 Training Program for Mining Technology**

In addition to the training activities covered otherwise, different short-term training programme will be conducted with the support of international NGOs and projects. In the NWFP arrangement with a Swiss NGO (Small Scale Enterprise Promotion Programme) is being initiated and is expected to finalize soon. Similar arrangements for training in other parts like Baluchistan and Sind will be made with other concerns including UNIDO, UNDP and GTZ. Key feature of this training programme is to introduce latest mining technology to semi-skilled and unskilled personnel working on different Marble and Granite mines in the country aiming at.

- a. Applying techniques leading to standard quarry production resulting in low material loss and higher productivity.
- b. Environment friendly mining practices, conservation of natural resources.

## **7.2.6 Training programme in Marble and Granite madeups at TTCs**

The program is aimed at developing, crafting skills including cutting, polishing among the participants. This will most likely result in creating new business in different parts of the country. Directorate of Manpower at Peshawar have agreed in including “Marble and Granite madeups” training programme at different TTCs in NWFP. Same model will be replicated in other provinces.

## **7.2.7 Internship with the Industry**

In order to introduce professionalism in the industry it is imperative to employ engineers and business graduates. The industry could not initiate in introducing professionalism because of;

- a. Lack of quality awareness within the industry.
- b. Lack of professional understanding
- c. Inability of the industry in meeting emoluments due to marginal operation

Internship program is designed for the industry for an initial period of six months. Details of this programme, including cost analysis is given in **annexure**. In this programme qualified engineers, geologist and MBAs are to be placed with support from government (if possible) and or banks (who have shown willingness).

### **7.2.8 Joint Ventures with International Partners**

- Invite the international leaders in marble and granite cutting, processing and mining technology to invest as partners in the development of marble and granite industry in Pakistan.
- Develop linkages of the industry with the foreign companies, Trade bodies and Associations in order to achieve international standard by using the experience of the international partners.
- Identification and promotion of mines (marble and granite) with substantial export potential in order to attract foreign companies to enter into joint ventures with local firms for the development of modern quarries.

## **7.3 Financial Package:**

### **7.3.1 BMR for Mines & Industry**

While 50 to 60 mines and twice as many process industries are expected to undergo BMR. Machinery requirements along with cost and benefit analysis have been done for assessing viability of proposed BMR and the benefit of bankers who will deal with these projects. Incidentally most bankers have felt the need for this kind of guideline and a blanket approval by SBP of Rs.700 million in this regard will be appropriate. Financial implication expected Rs.2.7 million to Rs.20 million per mine and Rs.0.3 million to Rs.20 million per processing unit. A pre-feasibility study is provided in the **annexure** for each of these BMRs.

### **7.3.2 Mine Collateralization Framework.**

Since investment in mining activity has been restrained due to unsympathetic behavior of banks toward informal mining. A system has therefore been devised which will allay the fears of financial institutions and provide them with adequate coverage and security. Assessment of investment requirements, supervision and alienation proceedings be carried out by the regulatory body while liquidation to be done by banks. DIMD will facilitate in amending rules and issue NOC to the applicants. The banks have further indicated their desire to check the credibility of individual miners through SMEDA and association.

### **7.3.3 Hypothecation and Pledge of Buffer Stocks in Clearing Compounds**

In order to develop warehouse and clearing compounds for raw material and Pre shipments export refinance to miners, and manufacturers as indirect exports and trader for warehousing are required to be provided by the commercial banks. As per existing rules of the banks and latest circular by SBP and trade policy 1997-98 these arrangements need to be facilitated by SMEDA. Total requirement in this regard is assessed at ½ of annual cost requirement of 145000 tons with about 60-70% financial out lay i.e. Rs.70 to 80 million only.

### **7.3.4 Export refinance facility for warehouse, as given in the trade policy 98**

In light of trade policy 1997-98 the ability to develop these clearing compounds and warehouses can be increased by defining them as indirect exports in addition to small manufactures who supply their process product to exporter. Total outlay for this is expected to be in the range of 100 to 120 million at any given time.

## **7.4 Fiscal Incentives.**

- a- Notification for Mineral Areas to be given the status/ incentives of special Industrial estates for five years. All private sector investment activities in these areas be provided with incentives compatible with approved special industrial estates
- b- Public sector allocation for master planning and infrastructure development in Mineral areas through matching funds from Excise duty.
- c- Permission to build infrastructure on user charge (toll roads etc) by private sector particularly by the mining community with tax holiday for toll income.
- d- Tax credit (matching funds from excise and royalty) to mine owners for developing social and physical infrastructure for benefit of local communities and the mining activities with the approval of concerned provincial authorities.
- e- Right to collateralise and financing for mineral prospecting, developing and mining in registered mining operations.
- f- Units exporting 50% of their produce indirectly be given the status and facilities of export processing units EPU's
- g- Duty free import of cutting tools, abrasives and parts used in the M&G EPU's for producing products for export markets.
- h- Additional 20% industrial development surcharge/ duty on import of finished marble and granite, slabs or tiles

## **7.5 Regulatory Frame work:**

While changes in mining concession rules 1976 are being proposed with a view to improve current regime for marble and granite exploration it is assumed that these changes will effect extraction of other minerals as well including rock salts, coal and gem etc. A key feature of proposed regulatory framework is towards reducing the uncertainty in miners. Therefore amongst other things it is also required that Mining Policy 1995 should be implemented. Following changes have been suggested in the mining rules 1976.

### **7.5.1 Processing of Applications.**

**a. To ensure timely processing** of applications for Prospecting and Mining License by the DIMD it is proposed that regular review of fate of applications along with approval dates to be done by standing committee.

**b. Prioritization of applications:** In order to reduce ambiguity on prioritization NWFP rule (S.15). A numbered receipt book should be used for establishing priority and public display through media should be followed. In addition to competitive evaluation of different work plans with first right of refusal to first comer.

**c. Renewal of application:**  
Discretionary powers for issuance of the license have been vested in provincial DIMD's for renewal of P/L & M/L, it needs to be made transparent through review of work plan, mining practices and compliance of mandatory responsibilities as specified in the P/L, M/L through field offices

**d. Submission of Work Plan:**  
Mandatory submission of work plans prior to commencement of exploration/ mining works should be decided in one month. The approval process need to be improved and made more transparent with involvement of standing committee on regulatory framework for any contentious issue.

### **7.5.2 Security of Tenure:**

Existing rules of security of mining tenure are very important from investment point of view. Therefore (S.36 and S.17) need to be elaborated and focused towards providing security of tenure to the mine owners. A matter of fact it is proposed that mining concession should be granted for periods not less than 10,20and 30 years with nominal increase in fee.

### **7.5.3 Assignment/ Alienation of licenses:**

In order to encourage improvement in exploration /mining it is proposed that Rule NWFP (S.11.1) to develop appropriate methodology to accommodate the possibility of joint venture arrangement with foreign or local parties, need to be built.

### **7.5.4 Arbitration and Appeal procedures:**

Discretionary powers with the secretary industry and mineral development are perceived as discriminatory and unjust. Referral to the proposed committee on regulatory and standards will remove this mistrust.

### **7.5.5 Surface Rent and Local Interference:**

Due to various recurring disputes it is proposed that Surface rent contracts should be registered with DIMD and local court of jurisdiction preferably DC/APA. Surface rent and local collections must be recorded and channeled and appropriate proportion should be set out for local development or taxed as income, otherwise.

### **7.5.6 Industrial Area status for Marble and Granite Mineral bearing Areas:**

In order to give much needed respectability and legal cover it is proposed that all the incentives provided to industries located in any industrial area including following should be notified by respective provincial governments

- a. right to collateral's and financing
- b. Allocation for infrastructure in development
- c. Permission to build infrastructure on user charge (toll roads etc) to be extended to the Marble and Granite producing areas.
- d. Approval of basic social and physical infrastructure through equivalent tax credit.

### **7.5.7 Fiscal Regime/ Taxation/ Royalty:**

Fiscal regime must be directed towards technology orientation and high productivity. Additionally the same should be applied more rigorously and equitably. Present resource generation indicates only partial application with potential for many fold increases as follows

- a. Royalty collection mechanism to be streamlined with assistance of trade association and local community on fee basis with progressive targets. Royalty is expected to increase from Rs.80 million to Rs.270 million in three years. (see **annexure**) Collection of royalty should be dealt solely by government for regulating
- b. All taxes including royalty, workers welfare and EOBI and surface rent etc should be lumped together and collected as royalty. Surface rent which works out to a maximum of 20% of the total royalty should be collected jointly with royalty
- c. Promising blocked areas may be released through contractual options or
- d. dead rent may be increased to Rs.100 per acre for first three years and 10%
- e. Increase every three years thereafter.
- f. Approval of Incidence of nominal renewal fee (Rs.5000) on operating mines with longer periods should be encouraged.



- g. It is proposed to have Penalties for non-development of miners during the stipulated period @ 50% to 100% of royalty to be decided by standing committee. This will ensure mine development and the cost of the mine development should be given back by way of royalty credit.
- e. Tax credit (from royalty payments) for mine development.

## 7.6 Institutional Framework

In addition to the existing, Pakistan Miners Association (PMA) and All Pakistan Marble Industry Association (APMIA), with provincial chapters, Marble and Granite Export Promotion council and standing committee on standards and Regulatory Framework are planned to be established. These nascent institutions when backed by provincial and Federal Governments will facilitate in strengthening small but vibrant associations with the help of field offices. Similarly strengthening /reorganizing of regulatory institution in various provincials governments is essential. However even after all the reorganization and strengthening is carried out, there will be enormous demand of coordinated work with a number of support institutions locally and abroad

Presently it is proposed that SMEDA should play a pivotal role in developing coordination with these support institutions, including:

Service Providers, Engineering Universities, Technical Training Center/Vocational training Centers, Bank and Development Financial Institutions, in addition to Machinery Manufacturers.

- Donors and interest groups. These include, Italian, German, Swiss, Dutch and other bilateral technical cooperation's, UNIDO, UNDP, ILO, IUCN and other multilateral institutions.
- Support institutions, including SMEDA, EPB, PMDC.GSP, SDA, BDA, FATA-DC, SIDB, PSIC, SSIP, ABAD, AA, PCATP.
- Regulatory Institutions like, DIMD, Inspectorate, EDBI, SS and Labor departments.

In addition Local Government and community is likely to play active role in the implementation of policy elements as advised.

### 7.6.1 Reorganizing /Strengthening DIMD

In addition to streamlining the concession granting & regulatory operations at respective DIMD, it is imperative that they play their due role in developing the mining sector some suggestions in the matter are as follows;

- I. **Structural changes**  
Appointments of well-trained and technical staff at Mineral locations and Setting up of local Offices with in the mineral bearing areas.
- II. **Operational activities**

- a. Review implementing status of work plan, as Approved by the DIMD.
- b. Check quality of the product Keep the proper record of categorize products of each Mine
- c. Give advice to the Mine Owners for the development of the quarry and follow up
- d. Public display/ dissemination of data & Information on mining prospects, concession and preparation of mineral dossiers.
- e. Play its role in infrastructure development in mineral bearing areas through public and private investments in toll roads.
- f. Provide maps & sketches etc of the promising area to the interested parties with the help of geologists and engineering consultants

## **7.6.2 Mineral Committee on Standards and Regulatory Frameworks for Marble and Granite Sector**

### **Objectives of the Standing Committee:**

- \* To assist the DIMD and other provincial government departments for drawing appropriate rules, regulations and legislation where required to promote Marble and Granite sector.

### **Activities**

- \* Amendment in mining rules as proposed by the M&G plan and follow up on implementation.
- \* To review the mines / local committee headed by DC.
- \* Help resolve surface rent & other issues with communities.
- \* Facilitate provincial focus on infrastructure development at mines.
- \* Establish industry standards and monitor.

### **Membership**

- \* The committee shall be chaired by the Secretary Industries, with members from DIMD, SMEDA, Industry Representatives, SDA / BDA, Inspectorate of Mines.

## **7.6.3 Marble and Granite Export Promotion Council**

### **Objectives**

- \* In order to develop greater focus and improve the delivery of the premier Export Institution EPB, it is proposed to develop a private sector consultative body representing various shades of Marble and Granite (M&G) Industry, to assist EPB in promoting exports of marble and granite in the world markets. **Facilitating entry of exporters in the target markets and development of networking with the key players in these markets will be the primary goal and objective of this council.**

## Structure

Since it is expected to play an advisory role, reflecting various shades of opinion, a broad-based forum is being advocated as follows: -

Members of the All Pakistan Marble industries Association (APMIA)	03 members
Members of the All Pakistan Mine Owners Association (APMOA)	03 members
Representative exporters of Marble and Granite Sector from Chambers	04 members

## Secretariat

EPB to provide full time employees/Officers on deputation to Council offices at Karachi and Peshawar each. Based upon evaluation of results this may be expanded to Quetta, Islamabad and Lahore, subsequently. The secretariat could be placed at the respective chambers, where admin support should be provided by them.

A formal announcement or notification by federal Minister of Commerce and Industries or Chairman EPB shall improve sense of responsibility with council and accountability with concerned EPB staff.

## Terms of Reference

1. The Council shall review rules / policies and ordinances issued and amended from time to time by the EPB (government) regarding exports and assist EPB in formulating strategies specific to Marble and Granite export.
2. The council shall assist in developing Inland and Foreign Warehouses and display centers in public/private sector for export facilitation to existing and intending exporters through interactions with provincial Govts, Banks and EPB.
3. The council-secretariat shall collect inquiries from the world market on Internet and through direct contacts with specific reference to the target markets. This information will be communicated to the exporters in the country through newsletters and e-mail.
4. The Council-secretariat will develop liaison with Foreign trade Associations and follow international events including Seminars / Workshops and Exhibitions where Industry delegations shall be facilitated for interaction with key players.
5. The council shall identify potential opportunities in international markets and develop strategies through consultants hired by EPB and monitor implementation.
6. The council shall work as an advisory body to different training/product development institutions set up by the EPB for achieving the identified potential and targets.
7. The Council members shall interact and guide its secretariat on regular basis who will keep liaison with and within EPB and SMEDA for various developments.
8. In the greater interest of Industry, it is suggested that the periodic council meetings should be held in EPB Offices jointly chaired by the private sector and respective DGs or Vice Chairman EPB.

9. The council-secretariat shall keep liaison with various trade associations locally (APMIA, APMOA and Chambers) and disseminate information through newsletters and meetings etc.
10. The council-secretariat will look after holding local exhibitions under EPB and invite selected importers identified by them and follow up trade enquiries generated abroad or during exhibitions.
11. Any other responsibilities specific to Export development of Marble and Granite.

## 7.7 Infrastructure

### 7.7.1 Infrastructure Development through Development projects, Private sector on BOOT

Infrastructure particularly Roads to mine sites play a very important role in access and extraction of mined products and may effect the quality of product as well because of imminent problems attached with moving machinery and products from mine sites. Resultantly higher freight and fleet maintenance cost reflect in industry pricing in addition to smaller and low value product. For this purpose following link roads and feeder access need to be developed in the country.

Exhibit 6

Infrastructure (Roads) required in different parts of the country

Area	Link Road	Feeder Road
Mohmand Agency	30 Km	100 Km
Bajaur	08 Km	20 Km
Buner	30 Km	90 Km
Mardan/ Nowshera	15 Km	45 Km
Swabi	15 Km	30 Km
Swat	30 Km	60 Km
Mansehra	20 Km	30 Km
Kohistan	20 Km	50 Km
Chitral	20 Km	20 Km
Dir	20 Km	40 Km
Therparker - Mithi	50 Km	70 km
Chaghi – Zard kan	30 Km	50 Km
Lasbela	40 Km	60 Km
Mashki Chah	40 Km	70 km
Jhuli	30 Km	60 Km
Tozghi	25 Km	60 Km
Total	423 Km	855 Km
<b>Source of Funding</b>	<b>Toll Roads on BOT basis</b>	<b>By Industry</b>

(Source: DIMD/FATA and own research)

If adequate safeguards for toll collection are provided, the marble & granite industry and miners can build significant proportion of link and feeder roads through private sector investments. Toll collection mechanism will ensure free access of private travel for locals /tribal and levy will be collected on commercial/ business travel only. Planning, estimation and supervision of these roads may be done through C&W department and alternatively the same may be entrusted to provincial MIFA (a new initiative).