

# CLUSTER DIAGNOSTIC STUDY

## Marble Processing

### RAWALPINDI/ISLAMABAD



#### ***Turn Potential into Profit***

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The document has been prepared as a part of the training organized by UNIDO on its approach to the cluster development. This document share initial findings on Marble processing cluster of Rawalpindi/Islamabad region<sup>1</sup>. The objective of this research is to create an initial understanding of the cluster for need assessment of intervention to upgrade this cluster by strengthening linkages between cluster actors and starting activities like but not limited to creating conducive environment, strengthening linkages for streamlining objectives and efficient use of resources, technical upgradation, human resource development, and program lending schemes. The data has been collected through visits to the marble factories and meetings with distinguished members of APMIA and other stakeholders.

## **1 DIMENSIONAL STONE – A DEFINITION**

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 minerals, which are Calcium compounds (calcareous) for marbles, Silica compounds (siliceous) for granite and Shale clay for slate.

Dimensional stones are characterized 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, and physical properties determine their appropriate extraction and processing requirements, in addition to bearing upon their end use.

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. Extensive deposits are located in Italy, India, Pakistan, Spain, 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, determining the density of the stone.

Marble is a durable stone in dry atmosphere only when protected from rain. The surface of marble crumbles readily when exposed to moist or acidic environment. Purest form of marble is statuary marble, which is white with visible crystalline structure. The distinctive luster of statuary marble is caused by the reflection of penetrated light from the surfaces of inner crystals.

### **1.1 MARKETABILITY OF DIMENSION STONE & SELECTION CRITERIA**

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:

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<sup>1</sup> The focus will be more on marble processing however granite and onyx are also processed/traded in smaller quantities in the cluster.

### *1.1.1 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 and white & green in onyx are preferred in the European markets. Middle East and Far Eastern markets are interested in white, black & beige colors in marble and green colors in onyx.

### *1.1.2 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.

### *1.1.3 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 corners 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.

Although color plays a dominant role in price determination but other attributes as explained above also play a vital role in the marketability of the dimensional stones. If the product is rare in color and has fine grain and homogeneous pattern, then it 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 also ranked in the medium price range.

## **1.2 PRODUCT CATEGORIES AFTER PROCESSING**

### *1.2.1 Slabs*

Slabs are large semi processed sheets of marble stone with varied sizes and thickness of 2 inches. 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.

### *1.2.2 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 than the polished ones to individuals and other small processing units from where they are polished and sold to market.

### *1.2.3 Polished Tiles*

These are the fully processed tiles sold in the market at competitively higher prices, which depend on vein structure color & shades.

### *1.2.4 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 without the high tech machinery. Major cluster of these items lies in Karachi, where more than 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.

### *1.2.5 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.

## **2 WORLD STONE SECTOR**

Natural stones are an integral part of the human history in terms of ornamental and construction use. The quarrying and working of stone, already practiced in ancient times by the Egyptians and the Greeks, was greatly developed in Italy under the Romans. However towards the end of the 18<sup>th</sup> century, economic activity in the stone sector developed for the first time with the invention of gunpowder and the use of mechanical cutting.

Dimensional stones are produced in more than 42 countries of the world while 12 of these producers are dominant in the international market i.e. 6 European countries and 3 each from Asia and Africa.

Technological advances in the last seventy years had increased the world production and consumption of dimensional stones to 150 million tons while, consumption came to about 8.8 billion square feet (820 million square meters), generating overall turnover of \$40 billion<sup>2</sup>. The majority of world consumption comes from material that is quarried in different countries than those where it is eventually installed. The leading producers -- China, India, Italy, Spain and Portugal -- account for 53% of world quarrying production.

The driving force in the sector was international trade, which is just under 29.6 million tons and equal to about 4.8 billion square feet (450 million equivalent square meters)

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<sup>2</sup> Analysis and research by Istat (National Statistics Institute), Acimm (Association of Italian Stone Machinery Manufacturers and Allied Trades), Assomarmi (Association of Italian Natural Stone Industry and Allied Trades), ICE (Foreign Trade Institute) and VeronaFiere

and has reached US\$ 8.6 billion<sup>3</sup> mark in 2004 with an annual average increase of 13% while China has shown the largest increase in its export value i.e almost 28% annually over 4 years. Italy, China and Spain are the major players in the international market and exported more than 55% of the dimensional stone's products (blocks and processed) by value. Other major exporters include Brazil, Spain, India, Turkey and Portugal.

Values in \$ 1,000

Top Exporters	2000	2001	2002	2003	2004
World	5,655,417	5,776,917	6,218,024	7,829,163	8,677,536
ITALY	1,899,869	1,793,676	1,763,925	1,945,361	2,146,577
CHINA	764,951	896,374	1,082,548	1,330,279	1,629,164
SPAIN	768,196	789,277	852,167	991,594	1,087,715 <sup>4</sup>
INDIA	499,633	478,898	582,695	667,214	741,811 <sup>5</sup>
BRAZIL	263,103	273,093	331,273	421,287	589,148

As far as product composition is concerned, in case of marble, 53% is exported directly from the mines while other 47% includes 45% of indoor and out door floorings and stairs while 55% in handicrafts and other construction materials.

Major importers of Marble & Granite products (processed and unprocessed) are Italy, USA, Japan, Germany, Italy and China and more than 60% of the products are directed toward these countries.

### 3 PAKISTAN

Marble and Granite is the sixth largest mineral extracted, the others being coal, rock salt, lime stone and china clay. Since 1990 mining & quarrying has consistently contributed 0.5% to the GDP. According to the industry estimates 1.37 million tons of marble and granite were produced while 97% of it was consumed locally.

Little efforts were made in the past to identify and estimate marble and granite reserves in the country. Some of the reserves of marble and granite were however calculated with the efforts made by development projects and concerned departments.

Known reserves of Marble in Pakistan are 160 million tones while actual reserves could be manifold. These reserves are mostly concentrated in NWFP and Balochistan. Estimated reserves of Granite in Pakistan are 2 billion M.T. out of which 1.15 Billion M.T. are in Thar - Sindh.

Major mining areas can be identified as Chitral, Buner, Swat, Lasbela, Swabi, Khuzdar, Mohmand Agency, Mardan, Kashmir and Mansehra. Mine in Mianwali has also started meager operations.

<sup>3</sup> UNSTAT+PCTAS (HS Codes 2515, 2516, 6801, 6802, 6803) (It includes all type of dimensional stones including marble, granite and onyx)

<sup>4</sup> Calculated by used straight line average

<sup>5</sup> Calculated by used straight line average

As far as stone is concerned, Pakistan is processing black, green, pink, gray, yellow and brown marble; green, white and brown onyx; and have reserves of red, green, black, grey, white, gold and yellow granite.

At present, quarry operations in Pakistan are far behind those in countries with modern quarry operations. All over the country, stone is quarried randomly using simple drilling and dynamite splitting techniques. These techniques are employed with limited knowledge of quarrying. Explosives are used irrationally, creating major waste and poor quality rough blocks. The obtained products are small, medium and large irregular blocks in the shape of "potatoes." About 50% of the material is wasted at the quarry and another 30% during fabrication. The basic quarry mentality in Pakistan is "hit and take."

The irregular blocks produced are difficult to handle and create problems in lifting, transportation, storage, and fabrication. The shape of the blocks complicates quality control of the rift or preferred cutting direction during the cutting process, which is important for strength, background color uniformity, and uniform texture.

The handling of material is done with basic equipment like hand-pressed oil jacks, flexible tripod lifting cranes, and cable winding machines. Such labor-intensive handling of the material is unsafe and not cost-effective.

Processing industry for dimensional stones in Pakistan started to develop in late sixties with housing construction and industrial activity picking up most of the product without quality-consideration and using local processing equipment. The 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.

Very few units 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 materials. There are only about 25-30 units which have all appropriate machinery to do one of the sequential activity, either of cutting slabs section or cross cutting. The following table shows the data compiled by APMIA and SMEDA in the year 1998.

Significant Industry and Installed Machinery in Pakistan										
Name of City	Total No. of Units	Gang Saws			Cutters			Auto Polishers	Manual Polishers	Chip Tiles
		Imported	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
NWFP & FATA	148	3	46		21	70	850	7	33	2
TOTAL	685	22	103	9	45	92	2215	12	385	45

The total population includes another 1000 units with over 2000 cutters of 12 - 36 inches. These units come under unorganized sector and specific information about them is not available. Recent development shows that new units have been installed in NWFP and FATA i.e. near mining areas. The entrepreneurs who were already working in the areas of Punjab where no local quarries are located own 10-20% of this new investment.

During the last decade, the exports from Pakistan, of Marble / Granite has been on a rise. In 2004, total exports of dimensional stone and its products from Pakistan were about \$12.5 million (while few experts say that it is above \$18 million). Last year growth was round about 12%. Major partner in international for Pakistan for these products have been Middle East, USA, China, Italy, UK & Germany.

Similar trends are obvious in local market. The construction industry is in boom and Marble processing is gaining popularity due to increase in its usage in construction industry, so the effect is multiplied and industry is expanding. Today almost all the modern architectural designs of houses and plazas include the final touch of beautiful shades of marble in exterior as well as interior portions.

#### 4 BENCH MARK:

Italy has remained a leading country in the dimensional stone business for centuries. It has a strong base of model mine with highest average for quarry production and state of art processing industry. Its contribution in research and 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.

Marble reserves in Italy are in many localities from the Alps to Sicily. The most important geographic area for producing marble is in the Apuan Alps in Tuscany, particularly near the town of Carrara, Lombardy, the Po Valley, Puglia, Sicily, and Verona-Vicenza.

Carrara is the largest cluster for marble and the well renowned for its quality quarrying and processing. But for this report we will be discussing Verona Marble cluster which is not the largest cluster but is becoming the most organized marble cluster in Italy.

The Encyclopedia of Arts and Industries, compiled by Pareto and Sacher in 1880, states that the most extensive quarrying of marble in the world takes place in Italy. It names as the most important centers if this industry Carrara, massa and Seravezza. The Veronese quarries, according to the encyclopedia, come after Apuan Alps in importance. Even in that period, Veronese marbles were known and appreciated abroad, as in Viena where they were widely used for monumental buildings.

Nowadays, there is still a certain amount of quarrying in Veronese territory, but the marble working industry has developed more. Verona is known as the most important centers of marble and, on a national scale, is in the second place for the exportation of stone products.

The cluster employees almost 5% (7,000 workers) of the whole marble industry of Italy and represents 3% (550 enterprises) of the enterprises. However if export and import figures are analyzed, it almost exports 13% and imports almost 2% of the country stone international trade inspite having extraction sites<sup>6</sup>. There are almost 20-25 machinery & tool manufacturers and suppliers (renowned all over the world) in the region, which strengthens their position as a quality processor in the world.

The marble zone in the Verona's province is first in Italy for the quantity of imported raw material, therefore the buyer has the opportunity of choosing the material which best interest and serves him, from the largest selection of varieties in the world.

The work of transformation or processing is extended to every field, from the most automated production chain operation to the skillfull artisan level, to the artistic sculpture. In a unique and small setting is concentrated a total of so many different professional skills and talents which allows them to process marble for every purpose and need: from the exterior facing to the interior decorating; from the ornamental to the funerary needs; from the urban dwelling to the largest building of architectural fame and prestige. Also, the favorable geographical position of Verona, the excellent ramification of roads, the shipping methods by container enable them the shipment to European countries and to the well equipped ports for the export by sea to all continents.

Different bodies like Association of Veronese Marble Workers, Association of Small & Medium Businesses, The Businessmen's Association of the Province of Verona, the Consorzio Val di Pan, Produttori Rosso Verona, Consorzio la Pietra, Progetto Marmo Consorzia Marmisti del veneto, Verona Chamber of Commerce, the town of Dolce have always taken interests to develop the marble industry of this cluster. VIDEOMARMOTECA (multi-purpose center that offers information, consulting and promotion services to stone industry) and CENTROPROVE (testing lab) are few of the success stories, which this cluster holds.

The cluster can be characterized as follows:

- Highly integrated with sophisticated Demand – Consumers, Architects and Construction Companies
- Strong association
- Industry focused on quality, training, planning and information access
- Transportation
- Diverse Processing Capabilities
- Focus on Cut-to-Size Jobs & Higher Value Addition
- Focus on Environmental impact of quarrying (Driver for Innovation)
- Investment in innovative technology
- Tradition of Quarrying

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<sup>6</sup> Marble in Verona, published by association of veronese marble operators, asmave

## **5 MARBLE INDUSTRY IN RAWALPINDI/ISLAMABAD REGION**

### **5.1 HISTORY**

Marble Industry has an imperative presence in the Rawalpindi/Islamabad Region. First investment came in 1960s when two industries one in I-9 Islamabad and one in Rawalpindi Cantt started their operations as full processors.

The stone was sourced from NWFP in aaloo shape (blasted) and was converted into slabs and tiles, which were then forwarded to various cities all over the country. The market expanded and entrepreneurs from Islamabad/Rawalpindi invested heavily in this industry.

The local consumption was a big factor for this heavy investment in those days as a new city was been constructed. Islamabad being the capital city was also giving good margins to industry and therefore growth in the investment as well as number of units increased in manifolds.

The cluster became the largest market for processed building stone in the country and to keep itself strengthened and market leader, cluster members initiated and implemented the idea of organizing and promoting this industry. The cluster took a monumental step in 1979 and an Association for all marble industry of Pakistan was being formed. Initially it comprised of members only from this cluster and was not registered under the ordinance. After strengthening linkages it was then incorporated as a company with limited liability under Companies Ordinance (XLVII of 1984) in October 1987.

The association comprising of 8 founding members (all from Islamabad/Rawalpindi region) started its operations as a registered association in Islamabad and expanded its outreach with incorporating 4 zonal offices situating in Peshawar, Rawalpindi, Karachi and Lahore.

### **5.2 PRESENT SITUATION OF CLUSTER:**

There are about 180-220 enterprises related to Marble industry in this region. The geographical spread of the units can be sketched as 40% each are operating in the areas of I-9 Markaz, I-9/1 and I-9/3; and Rawalpindi Cantt while 20% are spread over Tarnol, Sangjani, and other areas of Rawalpindi city.

Major processes include loading/unloading, handling & storing, cutting & sizing, and finishing/polishing of marble blocks into slabs, tiles, phool, patti and other handicrafts. The cluster is not manufacturing value-added products other than fireplaces, flower vases and fountains, which are also in small quantities. There are many types of finishing that includes polishing, sand blasting, bush hammering, acid finishing, brush finishing, honed finishing etc. but are only used by 1-2 exporters. There is only one genuine handicraft manufacturer and exporter in the whole region.

More than 2000 labor is associated with this industry working as supervisor, ustad and unskilled workers. Most of the labor has education level below primary.

As far as segregation by size and operation is concerned, all gang saw operators (large units) and (H.V) horizontal and vertical cutters (medium units) are procuring raw stone

in the form of large blocks (8 tones), small blocks (5-7 tones) and Boulders (2 tones). By safe estimates one can say that 20-30% of the raw material is coming in the form of these blocks to this region. The larger is the block higher is the price it gets. Prices also vary with the color and type of the stone.

Other 70-80% of raw material is coming in the shape of semi finished slabs, and thick tiles. These are directly procured by enterprises with single small cutters and few medium enterprises.

The situation was totally opposite few years back when entrepreneurs from NWFP had not invested in stone processing industry. Now NWFP enterprises have the comparative advantage over the availability of stone. Similarly trimming out the extra burden of unsquared stone (i.e. about 50% by weight age) by cutting slabs near mining areas before transporting it to this region saves transport cost.

Based on the above facts entrepreneurs from this region have also started relocating their processing units near to the mining areas to save transportation costs and hurdles in receiving the stone in time due to bad infrastructure and exploitation of certain competitors/stakeholders. Entrepreneurs are also viewing the opportunities in Karachi region where export is easy and local consumption is enormous as well.

Many prominent entrepreneurs have stated that the cluster has started shifting from full processing to a single cutter cluster and if such situation prevails industry will soon convert to show rooms only. Following table illustrates the number of enterprises and machinery installed in this region<sup>7</sup>.

Name of City	Total No. of Units	Gang Saws			Cutters			Auto Polishers	Manual Polishers	Chip Tiles
		Imported	Loc	Mini	H.V	48"	12"-36"			
RAWALPINDI	112		15	4	1	10	165		4	
ISLAMABAD	51	2	23	4	3	5	200	1	18	2
TOTAL	163	2	38	8	4	15	365	1	22	2

Name of City	Total No. of Units	Gang Saws			Cutters			Auto Polishers	Manual Polishers	Chip Tiles
		Imported	Loc	Mini	H.V 4	H.V 2	12"-36"			
RAWALPINDI	145		10	0	2	20	315		35	
ISLAMABAD	60	2	8	0	2	3	160	1	60	2
TOTAL	215	2	18	0	4	23	565	1	70	2

Similar industry life cycles have been seen in past in other countries as well but those clusters manage the relocation by targeting export markets, and importing block form other countries to ensure regular supply of raw material.

<sup>7</sup> The data was originally collected and compiled by APMIA in consultation with SMEDA in 1997. The data has been updated on the basis of non-technical survey conducted under this program.

New entrepreneurs are coming but the focus is on investing in single cutters and showrooms rather than installing full processing units. These are procuring semi-processed slabs directly from the units near mining areas and therefore local gang saw operators are facing a huge crunch.

A large number of showrooms have mushroomed over the last few years that are just procuring stock from the units near mines and are operating on small margins-high volumes with very minimal fixed costs and equity investment.

However they are waiting for the quarry conditions to get better so that square blocks start coming to the market. This certainly will stimulate positive competition and decrease extra edge that the processors near mining areas are getting.

## **6 ANALYSIS OF BUSINESS OPERATIONS:**

### **6.1 BUSINESS STATUS:**

Almost all of enterprises are working as sole proprietorship however there are very few examples in which units have advanced after starting of operations as sole to partnerships.

### **6.2 FINANCE:**

All of the businesses are being financed by equity. As far as operations are concerned credit-cash ratio is 50% as far as sale is concerned. However for procurement of raw material 90% is on the terms of cash when raw material is received.

The entrepreneurs who are mostly matriculate or maximum bachelors in different subjects normally maintain accounts. Although exporters are maintaining proper accounts while few have also hired munshees.

As far as maintaining business accounts in banks is concerned, transaction during exports and/or procurement and sale to Karachi are done through banks.

### **6.3 HUMAN RESOURCE:**

99% of the entrepreneurs are working as general manager of their business handling all operations i.e. factory operations, administration, marketing and client handling. 2000 manpower associated to it is mostly working as factory labor and there are very few units (5-10, who are exporter as well) have employees like manager, accountant, phone operators etc.

Average labour per single cutter is 2 per machine, for vertical/horizontal cutter and gang saw the average increases to 4-5 per machine. Large units also have helpers, crane operators etc. There is absence of formal training for marble processing all over the country, therefore all labor presently working in the industry have received on-job training. As far as literacy is concerned most of the labor is primary and very few have done matriculation.

### **6.4 RAW MATERIAL PROCUREMENT:**

As far stone type is concerned industry is processing sunny grey, white, zebra lasbella green, carara etc. and these stones are sourced from Lasbella, Loralai and mines from NWFP.

Daily procurement of this cluster can be averaged out at 200-300 tons per day, 70% of which comes in semi-finished form. Raw material is procured mostly through payment on delivery. Usually it's just a phone call, which starts the process, and mine processors (raw stone) and/or processor (semi-finished slabs/tiles) send the raw material by using their own delivery systems. The truck drivers bring the collection bill with them and take the signature from the buyer with the payment.

It is necessary to mention that almost 20% of the trucks are hijacked in between the route by other stone processors if the raw stone is in good shape. Truck drivers when scrutinize, tells that the truck was punctured or engine failed, because of which he had to sell the material to the nearest processor.

The reason for the whole scenario is that during shortage of material, processors give tips to truck drivers for getting raw material. Drivers also try to hold back from the cantt region where police takes bribe for entrance into the city in daytime area.

Truck drivers are also penalized by road authorities due to over weight. This cost is then transferred to the purchaser of the raw material. The reason for overloading is that because of being in irregular shape the actual output is less and therefore per ton transport fee is set at lower levels.

### **6.5 FINAL PRODUCTS:**

At present 90% of the capacities are utilized for the production of tiles while 10% goes for slabs and other handicrafts.

Average annual production of the cluster is around 150,000-200,000 square feet per day 80% of which can be attributed to tiles, the rest sells in the shape of slabs and handicrafts. Major final products are tile (12 inch \* 12 inch \* 0.5 inch), counter tops, stairs, window sil, qabr, patti, and handicrafts like phool, glasses, miniatures, paper weight etc.

### **6.6 PRODUCT SALE:**

70% of the industries located in this region are selling their final products directly to the consumers. This figure has increased over the period as small industry that was procuring slabs from within the cluster has started direct procurement from the units installed near the mines.

80% of the products are being consumed within the city. Similar trend has been observed for this figure also. This region was sourcing the semi finished and finished products all over Punjab. Now small clusters has developed in other areas of Punjab, which are directly procuring finished, and/or semi-finished products directly form the units installed near the mines of NWFP. However presence of Rawalpindi cluster products can be observed in Kashmir, Jehlum, Gujrat, Gujranwala, Faisalabad, Sargodha and Lahore.

As far as export is concerned, an average amount of US\$ 1.5 million can be linked to this region per annum. Most of the exports are order based and/or are through

commercial exporters. Entrepreneur from this cluster have managed to enter USA, UAE and EU market i.e. UK, France, and Germany till now.

## 6.7 WASTE MANAGEMENT

There are two types of byproducts of marble processing. During marble processing 30% of the stone (incase of unprocessed stone) goes to scrap because of being in smaller size and/or irregular shape. This is then sold to chip manufacturers. In case of semi processed slab the scarp level reduces to 2-5%.

The other waste material is slurry. It is basically the water containing marble powder. The water is reused till it gets thick enough (70% water – 30% marble powder) to be insoluble for marble powder.

It can be safely estimated that 1 ton of marble stone processed in Gang-Saw or a vertical/horizontal cutter produces almost 1 ton of slurry (70% water). Single cutters though have lesser slurry waste.

This waste is initially stored at the slumps/storage tanks and then is thrown out with the help of trolley tractors. There is no designated place for this waste and can become an environmental issue for the industry.

## 6.8 PROCESS FLOW:

Processes	Machinery	Process Description
1. Squaring of Large Stones	Squaring Machines	Large Stones with irregular shape are squared or atleast one side is leveled so that the stone can be placed in a proper manner on Gang saws and maximum square feet. of pcessable stone can be retrieved.
2. Slab Cutting	Gang Saw/Vertical Or Horizontal Cutters	In this process squared/unsquared stone is cut into large slabs, which are defined as large on the basis of their length and/or width and/or height.
3. Sizing and Cutting into Slabs/Tiles	Single Cutter 12' to 36'	The large slabs are then dissected into saleable sizes, which can be in the form of slabs/tiles/patti etc.
4. Profiling, Edging, chamfering and calibrating	AutoLine	This is the first finishing process for the marble tile/slabs. Edges are smoothed and tiles/slabs are chamfered and calibrated.
5. Polishing	Manual/Auto-polisher	Polishing is done to give an attractive look to the products.

90% of the units are just operating on process number 3 while 30% have the polishing facility. Polishing is mostly done at the construction premises after installation through mobile polishers. These mobile polishers are working as separate entities and receive orders from the thekedar/construction companies directly.

## 6.9 VALUE CHAIN ANALYSIS

### 6.9.1 Slab Cost Distribution<sup>8</sup>

Process	Badal (Nawagai Bajor Agency)		Fancy (Lasbella)	
	Value	Percentage	Value	Percentage
Stone Cost	49,600	9.84%	94,200	12.46%
Transportation Cost	40,300	8.00%	142,600	18.86%
Sawing Cost	124,000	24.60%	155,000	20.50%
Polishing Cost	94,150	18.68%	113,022	14.95%
Wooden Bundles	30,000	5.95%	30,000	3.97%
Loaded into Ship	42,000	8.33%	42,000	5.56%
Dubai	27,000	5.36%	2,700	0.36%
Margin	96,950	19.24%	176,478	23.34%
Sales	504,000	US\$ 24 /sqm	756,000	US\$ 36/sqm

### 6.9.2 Tile Cost Distribution<sup>9</sup>

PROCESS	BADAL (NAWAGAI BAJOR AGENCY)		FANCY (LASBELLA)	
	Value	Percentage	Value	Percentage
STONE COST	108,500	21.53%	176,000	23.28%
TRANSPORTATION COST	12,000	2.38%	70,400	9.31%
SIZING COST	26,371	5.23%	26,371	3.49%
POLISHING COST	120,000	23.81%	120,000	15.87%
WOODEN BUNDLES	32,000	6.35%	32,000	4.23%
LOADED INTO SHIP	42,000	8.33%	42,000	5.56%
DUBAI	27,000	5.36%	2,700	0.36%
MARGIN	41,629	8.26%	97,529	12.90%
SALES	357,000	US\$ 19.5 /sqm	567,000	US\$ 27/sqm

<sup>8</sup> Assumption: Slab 2cm Thickness Slabs Polished Packed into wooden Bundles FOB, 120 ft Box Container (350 sqm.) exported to Dubai, Recovery of 60 sqft/ton

<sup>9</sup> Assumption: Strips 30.50 width by free running length cut into 2 cm thickness bought directly from factory nearside queries Polished Packed into wooden cases FOB, 120 ft Box Container (350 sqm.), exported to Dubai, Recovery of 120 sqft/ton

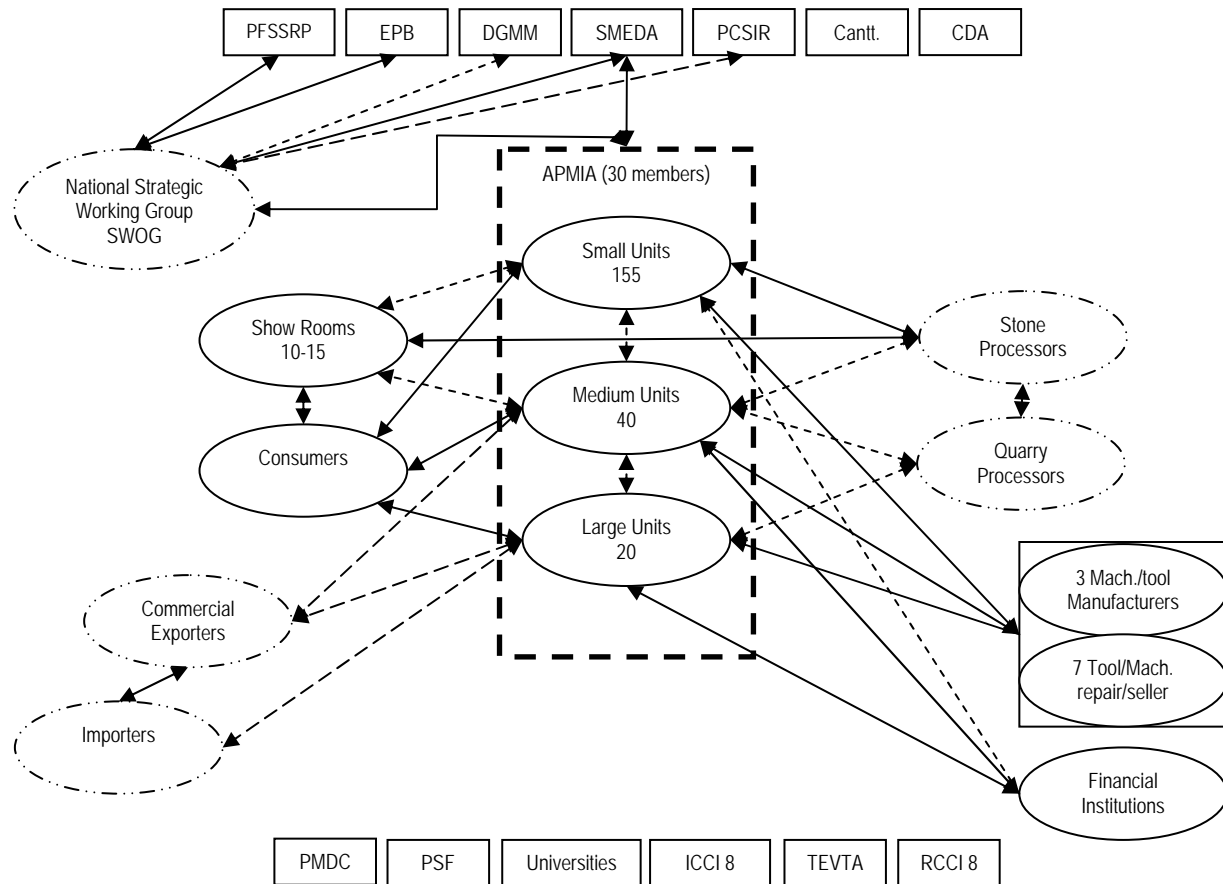


### 6.9.3 Slab from Squared Block<sup>10</sup>

PROCESS	BADAL (NAWAGAI BAJOR AGENCY)		FANCY (LASBELLA)	
STONE COST	75,300	14.94%	138,500	18.32%
TRANSPORTATION COST	16,328	3.24%	57,730	7.64%
SAWING COST	50,200	9.96%	62,750	8.30%
POLISHING COST	94,150	18.68%	113,022	14.95%
WOODEN BUNDLES	30,000	5.95%	30,000	3.97%
LOADED INTO SHIP	42,000	8.33%	42,000	5.56%
DUBAI	27,000	5.36%	2,700	0.36%
MARGIN	169,022	33.54%	309,298	40.91%
SALES	504,000	US\$ 24 /sqm	756,000	US\$ 36/sqm

### 6.10 CLUSTER MAP & INSTITUTIONAL MATRIX

<sup>10</sup> Assumption: Slab 2cm Thickness Slabs Polished Packed into wooden Bundles FOB, 120 ft Box Container (350 sqm.) exported to Dubai, Recovery of 150 sqft/ton (Squared Block)



- Abbreviations:

PFSSRP: Pakistan Financial Services Sector Reform Programme

EPB: Export promotion Bureau

DGMM: Directorate of Mineral & Mines

SMEDA: Small & Medium Enterprise Development Authority

PCSIR: Pakistan Counsel of Scientific & Industrial Research

Cantt: Cantonment Board

CDA: Capital Development Authority

PMDC: Pakistan Mineral Development Corporation

PSF: Pakistan Science Foundation

ICCI: Islamabad Chamber of Commerce & Industry

TEVTA: Technical & Vocational Training Authority

RCCI: Rawalpindi Chamber of Commerce & Industry

Related stakeholders shown on the upper row have closer (not necessarily better) relations with the cluster as compared to the stakeholder shown below. Stakeholders shown in dotted lines fall outside cluster but are integral part of the value chain.

- The dotted oval represents stakeholders which are outside the cluster but are directly linked to the cluster primary actors.
- The dotted line between quarry processor and the processors is due to provision of un-squared block which increases transportation costs and inefficiency for the processors.

Description of secondary actors of cluster is as follows:

#### *6.10.1 APMIA All Pakistan Marble Industry Association*

After incorporation in 1987, APMIA increased its geographical presence and now Islamabad/Rawalpindi region represents only 15% of the membership. However being originated from this cluster, the pioneers have always played a major role in different activities perform all over the country.

The role of APMIA was at peak when it was the caretaker of all tax issues for the entrepreneurs and it got its maximum membership in 1999 (135 from this region 800 all over Pakistan) when sales tax was a big issue. However as the policy on sales tax has changed (i.e. sales tax is waived off from the enterprises showing less than Rs. 5 million sales annually) the members have lost interest in being the member of the association. Now membership includes almost 85 enterprises from this region and 500 all over the country but annual fees was submitted by very few members. APMIA is now increasing its geographical presence and will be developing a zonal office in Balochistan, which was represented by Sindh region till now.

Formally or informally association and its members (based in this region being in capital of the country) are performing different kind of activities to develop this industry with different donor agencies and government departments. However these activities are mostly individually driven and very few members are working actively for the industry.

Elections are near so industry is giving mixed kind of signals about the association and strong positive and strong negative comments on the working of APMIA.

As far as formal correspondence is concerned, APMIA is always in contact with EPB due to foreign delegations and exhibitions. However percentage of exporters in this region is very less and these few have their personal contacts in EPB therefore such correspondence have never resulted in an effective output.

New entrepreneurs hardly know the role of APMIA neither APMIA has tried to strengthen its position in the industry.

#### *6.10.2 Rawalpindi & Islamabad Chamber of Commerce & Industry*

Rawalpindi Chamber of Commerce and Industry is one of the oldest chambers of country. It has almost 1900 members however Marble Industry that claims that it is the oldest and the largest industry of this region have only 8 members in RCCI which have renewed their membership after motivational meetings. Nobody from marble industry

has ever won an executive seat of these chambers, nor has any executive committee been formed for this cluster.

Similar type of relations ICCI holds with the industry and has only 8 members from the marble industry.

During the interaction, few individuals have been motivated and many of the entrepreneurs have showed interest in strengthening marble entrepreneurs' presence in the chambers to use the platform for cluster development.

#### *6.10.3 Capital Development Authority*

CDA allotted a fixed number of plots for this industry, but the plan was never executed and marble industry increased in manifolds. Few entrepreneurs feel that this overcrowding of similar industries have decreased the margins and no. of showrooms exceeds no. of customer per day.

CDA has now banned installation of marble processing machinery in the region and capacities can only be increased in the presently registered units. However information about talks on development of a separate Marble city in vicinity of this region have been heard but no actual plan is been developed.

#### *6.10.4 Cantonment Administration*

Units present in and near Cantonment area are always in various kind of pressure from the authority. The authority has banned the entrance of trucks in the day area, which increase the opportunity of exploitation by police.

The second option is a bridge that is directly linked to pirwadhai road (direct entrance from GT road) but is only 15-18 feet wide, which allows only one-way traffic at one time. Railway and cantonment authorities have different viewpoint as whose responsibility is to develop this bridge.

Road is also not in good condition and this has resulted in serious accidents damaging marble show room property as well.

Truck drivers show reluctance and pressurize for extra money for coming to this area because of these reasons.

Some entrepreneurs also feel threatened of the fact that housing area will expand, and these units may be notified to relocate their units because of the noise pollution they are creating in the city vicinity.

#### *6.10.5 Machinery and Tools Manufacturers & Suppliers*

There are only 2-3 machinery manufacturers and 1 tool manufacturer in this region. These large manufacturers are supplying machinery and tool all over the country. As far as relation with local industry is concerned, they are supplying tools on 50% credit 50% cash basis.

As far as investments in new machinery in this region is concerned, very few has procured large processing machinery since 5 years in this cluster, however enterprises have heavily invested in small single cutters.

Tool market as in quantity of blades and polish heads has developed as final production and local consumption is growing in quantum. Few commercial traders are also importing tools, which are around 5-10 in numbers. Few machinery tools are also procured directly from Karachi.

#### *6.10.6 Financial Institutions*

Financial institutions do not see this cluster as a favorable investment. The reason behind this fact is most of the entrepreneurs are illiterate, are happy with the present way of cash handling, and are not expanding into heavy machinery. According to a general survey conducted by a bank, industry is operating at 10% net profit margin. Very few have business accounts and the units procuring raw material from Karachi or are in exports use business accounts for transactions.

A research by a bank shows that there is a potential for a leasing program for small cutters for small units.

#### *6.10.7 Government Departments and Donor Agencies<sup>11</sup>*

SMEDA initiated a cluster development initiative last year, which has resulted in the development of a PC-1, which has been forwarded for EDF funding to develop a Marble & Granite Processing & Training Center. Ministry of Commerce has supported the idea but approval of the projects will take few months more. The idea was shared with different government departments therefore a linkage of industry has been strengthened with EPB and Pakistan Science Foundation PSF.

Another project for Model Quarry Development has been forwarded by SMEDA for EDF funding which is in implementation stage in Buner.

EPB has selected this industry as an export opportunity and is a partner in different kind of activities with other government departments' initiatives like recruitment of consultants, changing policies for development of stalls in international exhibitions etc. for this industry. However as there are very few exporters from this region, direct contact with primary firms is very less.

Pakistan Science Foundation has been in loop and a machinery re-engineering project for auto-polisher has been forwarded by APMIA in collaboration with ICCI, NUST-TIC and SMEDA.

PFSSRP (Pakistan Financial Services Sector Reform Program) has initiated cluster mapping of this industry all over Pakistan however the survey is contracted out to the three provinces other than Punjab due to mining concentration in other provinces.

USAID/SMEDA have formed SWOG committee, which includes member of APMIA, DGMM, Miners Association, Ministry of Petroleum & Natural Resources and EPB for proposing projects for the development of marble industry to Ministry of Industries and Production. The committee is due to forward proposal to fund model quarry project for private-public partnership in 10 quarries and 5 common facility and training centers including 1 in this region. These steps will ensure supply of squared blocks to this cluster. The final meeting is to be held on December 20, 2005 with Minister for

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<sup>11</sup> Formal letters have been sent to heads of different government organizations for sharing information on their activities related to this cluster.

Industries and Production, after which the proposals will be taken to Prime Minister of Pakistan.

Government of Pakistan has also exempted custom duty for the marble processing industry on importing processing machinery, tools, and specialized trucks. However this facility is not for commercial importers.

Islamabad being the capital city has offices of all federal departments related to industries and production but as a country's capital they are focusing more on industries which have large contribution to GDP and exports like textile, engineering, leather, surgical instruments, and sports goods etc., even if marble industry is being discussed focus always has been more toward the mining areas only so this cluster always get neglected.

However formally and informally few activities were started with departments like Expert Advisory Cell (abolished), PCSIR and TEVTA for training institute but no formal activity was designed and if designed was not followed up.

APMIA with PCSIR started working for the development of a training institute which is now in the hands of PCSIR only. This training institute will be developed in coming year in Peshawar.

	APMIA	RCCI	ICCI	EPB	SMEDA	PSF	PCSIR	EDB/EAC	PSIC	NPO	Vendors	FIs	PFs
APMIA	x	2	2	2	5	2	2	2	1	1	2	1	4
RCCI	2	x	2	3	5	1	2	3	2	3	0	2	1
ICCI	2	2	x	2	3	3	**	**	1	3	2	2	2
EPB	3	2	2	X	4	**	**	**	**	2	1	**	3
SMEDA	5	5	3	4	X	2	4	5	4	3	3	2	3
PSF	2	1	3	**	2	X	**	**	**	**	1	0	2
PCSIR	2	2	**	**	4	**	X	**	**	**	2	0	2
EDB/EAC	2	3	**	**	5	**	**	X	**	5	1	0	1
PSIC	1	2	1	**	4	**	**	**	x	**	0	0	0
NPO	1	3	3	2	3	**	**	5	**	x	0	0	0
Vendors	2	0	2	1	3	1	2	1	0	0	x	2	5
FIs	1	2	2	**	2	0	0	0	0	0	2	x	2
PFs	4	1	2	3	3	0	2	1	0	0	5	2	x

Not Applicable	x	Know but never interacted	1	Formal Relationship	5
Not Explored	**	Just interacted	2	Enthusiasm	6
Negative	-1	Formal Correspondence	3		
Don't Know each other	0	Few Joint Projects	4		

## 7 SWOT ANALYSIS

### 7.1 STRENGTHS

- One of the oldest cluster for marble processing in Pakistan (history & experience)

- Located in and around capital city of Pakistan (relationship with government and foreign consulates)
- Islamabad has lots of planned construction area so local market is available.
- Literacy rate is better than other marble clusters leaving Karachi.
- Have 2 chambers of commerce in the vicinity.
- The head office of APMIA is located in the cluster that gives national leadership to the cluster.

## **7.2 WEAKNESSES**

- In spite of being the largest cluster of Rawalpindi/Islamabad region industry lacks stimulus towards value addition, and investment in high-end machinery and Human Resource is minimal.
- Comparatively disadvantaged in case of raw material availability and transportation costs if compared with units working in NWFP, Balochistan and Karachi.
- Comparatively disadvantaged in case of export and local consumption if compared with Karachi.
- Comparatively disadvantaged in case of investment portfolio and costing structure if want to import squared block from abroad.
- There is a 100% demand-supply gap of skilled labor in the industry as far as export quality processing is concerned.
- Due to lack of export culture, industry is dependent on local machinery and quality of product is not given proper weightage. It is a fact that only one unit has the facility of modern squaring and auto polishing for export purposes. This unit is providing limited services for squaring to local units in the area.
- There is no waste management policy or strategy for this cluster. Small pieces of stone are only used for marble powder and chips while there is no dumping place or feasible utilization of marble slurry.
- Very low membership in chambers and association activities.

## **7.3 THREAT**

- Entrepreneurs may not be willing to invest in labor presently working with them because of fear of job change and meager opportunity of improvement because of fewer processes.
- Even if any importer is ready for a business transaction, cluster fails to finalize the contract because of time delays due to irregular shape and irregular supply of the marble stone.
- Investment on high quality machinery in final processes is not feasible due to low quality mining and quarrying.

- China has already destroyed the granite processing opportunity with its low cost bulk selling.
- Minimizing the trade barriers and tariffs, India may come as a big supplier of finished and unfinished marble products.
- More investment in processing units near mining areas may create more shortage of raw material.
- New regulations (load per axel) if implemented by road authorities may hinder the supply of stone from the mines.
- Invasion of cheap ceramic tiles in the market

#### **7.4 OPPORTUNITIES**

- On average 38% of the marble excavated from the mines in any country is exported in the same year which shows high potential for export. This figure is at 3% for Pakistan.
- Industry has been defined as zero-rated industry therefore has no import tariffs and custom duty on import of machinery, specialized trucks and other tools.
- Pakistan has large reserves of several varieties of Marble.
- Raw material availability for handicraft manufacturing.
- Almost 10 model quarry projects are planned which will ensure square block supplies to the cluster.
- Mines from Mianwali may start operating which is near to this cluster.
- Policy climate in NWFP and FATA is getting better which will also ensure better supply of raw material. Criticize

## **8 VISION & STRATEGY**

### **8.1 VISION STATEMENT**

To be the most dynamic cluster of Pakistan with strong linkages across the value chain, catering high bulk exports; and investing near the mining areas for capitalizing in local market within 5 years.

### **8.2 VISION & STRATEGY**

The objective is to strengthen the cluster so that it can streamline itself with the country vision and in the meantime cluster would streamline its value chain so that enterprises of this cluster are more prepared to catch all opportunities.

Strategy will be to streamline backward and forward linkages so that enterprises are able to cater bulk export requirements of trade partners. This will be achieved through better networking, development at quarries and investment in new technologies for better processing. As investment will come in new technologies human resource development will also be done for optimal utilization.



As far as local market is concerned market forces will play a major role and therefore processing units will move toward the mining areas for cost minimization and decrease comparative advantage. A facilitation mechanism will be developed for effective and efficient asset relocation.

## **9 FUTURE ACTION PLAN**

### **9.1 STRENGTHENING OF ASSOCIATION**

Association will play the major role in development of this cluster. Few motivational meetings have taken place recently on this issue one of which was attended by 32 individuals. Local elections have already taken place in first week of January and Chairman All Pakistan will be decided in executive meeting to be held on February 7, 2006.

- Objective: To have a strong platform for the development of the cluster and overall industry.
- Continuous Activity.
- Meetings will be arranged time to time basis.
- SMEDA will take the responsibility initially however as the objective is to strengthen the association activities will be handed over to the association.
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### **9.2 STRENGTHENING OF LINKAGES WITH CHAMBERS**

Few primary firms have already started working on to strengthen linkage with chambers and 4 industries from each region have taken membership in Islamabad and Rawalpindi Chambers respectively. The objective is to atleast develop political presence in the region and there is chance of having a seat in ICCI as an executive member in coming year.

- Objective: To utilize chamber's platform and to develop a feeling that this cluster is an important part of this region.
- Continuous Activity.
- Meetings will be arranged time to time basis.
- SMEDA will take the responsibility initially however as the objective is to strengthen the association activities will be handed over to the association.

### **9.3 NETWORK DEVELOPMENT FOR RAW MATERIAL PROCUREMENT**

As it has been explained that major set back to industry is the low quality and unmanaged supply of raw material to the cluster, initially one network will be developed which will ensure efficient supply of good quality stone for export purposes. Proper linkages with the one or two quarries will be developed which are producing good quality stone and better sizes so that export potential can be exploited. Meetings with few primary units have been started on the idea.

- Objective: Streamline Backward linkages to ensure bulk exports at higher margins
- Meetings will be arranged time to time basis.

- SMEDA will take the responsibility initially however network will be strengthened for self sustainability.

#### **9.4 AWARENESS WORKSHOP**

To develop a vision and long term strategy it is necessary to inject motivation for export. SMEDA have already arranged an awareness workshop on export processes and opportunities and cluster development on December 29, 2005. The activity was supported by RCCI, APMIA, EPB, SBP and UNIDO and each provided free representation and technical support to the event. 16 entrepreneurs from the industry and 20 individuals who want to come in marble export attended the workshop.

- Objective: To inject out of the box thinking and to have a get together where development is discussed.
- Total costs to SMEDA Rs. 8,000
- Costs eliminated due to cooperation and/or support by other organizations Rs. 50,000
- APMIA and private sector contribution as fees and technical support Rs. 10,000

#### **9.5 FORMAL CLUSTER MAPPING**

PFSSRP has already been asked to conduct cluster mapping for the Sindh, Balochistan and NWFP by the SWOG committee. The questionnaire was designed in Islamabad in the presence of EPB, SMEDA and entrepreneurs from Marble Industry. SMEDA has asked Mohammad Ali Jinnah University to assign the PHD students for thesis on this subject and negotiations have been finalized. MAJU will start the project with the same questionnaire in the next semester starting in February 2006.

- Objective: To have better understanding and reliable data for future strategy for this cluster.
- Formal meeting to be held after election between MAJU and APMIA for MoU signing.
- Costs sharing by APMIA
- Technical guidance from SMEDA and PFSSRP
- End Date June 2006

#### **9.6 MARBLE & GRANITE PROCESSING AND TRAINING CENTRE**

As already mentioned in the report, a PC I has already been submitted to Ministry of Commerce for EDF funding and PSIC. Strengthening of linkages will help better and fast implementation of the project. SMEDA, EPB and APMIA are partner of this exercise. The process has been delayed but there are high hopes after the election of APMIA and the decision to be made in the final meeting of SWOG committee.

- Objective: A processing setup and a training institute to attract investment and work as a model to be followed.
- Revival of the activity after association's election.
- Funding requested Rs. 120 Million for 3 Year operations after that it will run as a sustainable project with head from the private sector.
- End Date for Approval June 2006

### **9.7 AWARENESS & FORWARD LINKAGES FOR HANDICRAFTS**

Qabr manufacturers have good art in their hand for carving and engraving but they have never exploited the idea for using their skill in interior designs and articles. Awareness workshops and creating linkages with major handicraft display centre can streamline the process. If idea gets a success a separate display centre/training institute for exploiting export potential can be included in the action plan.

- Objective: Capacity Building of smallest units of this cluster
- Network Development
- SMEDA will take the responsibility for the motivation and passing out the idea.
- December 2006

### **9.8 SLURRY WASTE MANAGEMENT**

Different researches on how to reduce weight of slurry thrown out from the factories is an option. We can also lookup for a dedicated area for this slurry for better environment.

According to an Indian research this slurry waste can be used to manufacture slurry bricks which will then come as a commercial alternate for red brick. However a feasibility report would be required to back up the argument.

- Objective: New earning potentials and environment safety.
- Start Date July 2006 for the feasibility report.
- SMEDA will be preparing the report.

### **9.9 WIDENING OF BRIDGE FOR UNITS NEAR WESTRIDGE**

This has always been a talking point but no action has been taken till now. Few members of APMIA have been motivated to interact with local bodies keeping in mind that election is coming and situation can be exploited.

- Objective: Easy passage for the supply trucks
- Activity will start after the APMIA election.
- APMIA will take the responsibility.
- SMEDA will be working as a facilitator.

### **9.10 MARBLE CITY**

Similar is the case with exploring the opportunity to develop a separate marble city for this cluster. Due to limitations from CDA and as this is a weight loosing industry, and it is better to shave all the scrap before transporting it to the far areas, proper shifting for the cluster can become the major activity for the business development of manufacturers of this cluster.

- Objective: Decrease comparative disadvantage by minimizing extra transportation costs of scrap marble
- Activity will start after the APMIA election.
- APMIA will take the responsibility.
- SMEDA will be working as a facilitator.