



## INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, ECONOMICS AND MANAGEMENT

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## MANAGEMENT OF STONE CRUSHING INDUSTRY AND ITS IMPACT ON EMPLOYEES AND ENVIRONMENT - A CASE STUDY

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### ABSTRACT

*The present study tries to find out the performance of SCUs, its impact on employees and environment. As one of the units of informal sector, the SCUs have been significantly contributing in strengthening the small scale sector with establishment of 12,000 units with annual turnover of US\$ 1 billion and providing direct employment to over 500,000 people in its various activities. But the study extremely found that the SCUs have a regressive and insignificant impact on socio economic conditions of workers due to low wages, lack of working and welfare measures and environment...., Accordingly, the study intended some policy implications to balance the existence of SCUs, employees welfare and environment protection.*

### KEYWORDS

Environment, Emission, Informal Sector, living conditions, life expectancy pollution, vicious circle.

### INTRODUCTION

The challenge we face today is to reconcile the demands of population growth (employment), the desire for continued industrial development and the need to preserve our environment. It necessitates finding new approaches to industrial development both in developed and developing countries that will allow us to preserve the ability of environment to sustain human life. Thus it can be said that the environment and the industrial establishment is the two sides of a coin which can not detach them; but every aspect has its own significance and effects on other establishment and they have to correlate each other to accomplish cost-effective goals. Keeping this in mind, the study tries to carry out to assess the impact of Stone Crushing Industry on Employees and Environment with the following objectives and methodology.

### OBJECTIVES OF THE STUDY

1. To briefly analyze the prevalence of Stone Crushing Units in India
2. To study the economics privileges of SCUs on the workers
3. To find out the environmental effects and
4. Analyze the efforts to protect environment from the SCUs and
5. To furnish policy implications regarding SCUs and environmental protection in the study area

### METHODOLOGY ADOPTED IN THE STUDY

#### SAMPLING

Multi-stage stratified random sampling method is used in the present study. The functioning of Orange category non-hazardous Stone Crushing Units is taken in to the study. There are 46 such units have functioning with more than 2000 workers in the surrounding area of the Perecherla village, Guntur district of Andhra Pradesh. The total selected respondents are 196. Of the total, about 98 households each from the workers of SCUs and non-SCU households have selected for compared the actual impact of these units on the workers.

#### DATA COLLECTION- TECHNIQUES OF ANALYSIS

Primary data from households is collected with the help of structured schedule. Trust worthy informants have picked up from the units. The required secondary data has been obtained from various Journals, newspapers District abstracts and concerned departments. In analyzing the data, **Cross section analysis** method is adopted.

#### STONE CRUSHING INDUSTRY AND ITS ECONOMIC SIGNIFICANCE

Stone crushing industry in India is an unorganized small-scale sector scattered all over India. It is basically a labor intensive small scale industry where most of the operations are performed manually. Most of the plant and machinery has been conventional in nature and fabricated locally and has lacunae in its design, layout & operation etc. The conversion of naturally occurring rock into crushed and broken stone products involves a series of distinct yet interdependent physical operations. These include both quarrying and mining operations (drilling, blasting, loading and hauling) and plant process operations (crushing, screening, conveying and other material handling and transfer operations). The mine stones are transported to the crusher sites besides road through tractor trolleys or pay-loaders. The pay-loaders unload the mined stones into materials such as stone mines, river beds etc., Based on these operations, the workers are employed at different places as per the nature of work and are exposed to silica dust of different concentrations. Most of the laborers who have work in stone crusher units are related to rural and economically backward areas where employment opportunities are limited and therefore it carries greater significance in terms of social importance in rural areas. It is a source of earning for the uneducated poor unskilled rural people.

It is estimated that there are over 12,000 stone crusher units in India. The number is expected to grow further keeping in view the future plans for development of infrastructure of roads, canals and buildings that are required for overall development of the country. In India, the Stone Crushing Industry sector is estimated to have an annual turnover of Rs.5000 crores (equivalent to over US\$ 1 billion) and is therefore an economically important sector. The sector is estimated to be providing direct employment to over 500,000 people engaged in various activities such as mining, crushing plant, transportation of mined stones and crushed products etc (CPCB 2009).

The stone crusher is one such industry that exists in the vicinity of almost all major cities/towns throughout the country in all the states because the construction activities go on throughout the country. As transportation of stone over long distances adds to cost of the crushed stone products, the crushers need to be necessarily located nearer to the demand centers such as Cities, Bridges, and Canals. Stone Crushers also need electricity supply and large number of man power in its operation. It also needs access roads for the movement of mined stone as well as crushed stone products. That is why; most Stone Crushers are located

along the periphery of Cities or in the vicinity of major construction projects. In most cases the Stone Crushers come up in clusters of number of units ranging from five to fifty in one cluster. The crushers are located nearer to the source of raw material such as Stone mines, River Beds and so on.

#### ENVIRONMENTAL PROBLEMS ASSOCIATED WITH STONE CRUSHERS

The stone crushing units is recognized socially and economically an important sector creates substantial turnover and employment to unskilled labour. But environmental pollution by way of the fugitive emissions affects the human health etc. Some of them are (www.apfed.net):

**EMISSIONS DURING MINING:** The stone is mined from stone mines with the help of blasting and breaking by mechanical means or manually. During blasting and other operations substantial amount of fugitive dust emission occur intermittently.

**EMISSION DURING UNLOADING OF MINE STONES AT CRUSHER SITE:** At the time of unloading of mine stones into the storage hopper, large amount of fine dust is emitted, which appears like dust cloud. These emissions are intermittent and last for about a couple of minutes during every unloading. Generally there could be two to six unloading per hour. These emissions occur at an elevated levels and the dust is carried by wind currents to long distances.

**EMISSIONS DURING CRUSHING OPERATIONS:** During the crushing operation size reduction takes place bigger stones are broken into smaller sizes and in the process some stone pieces get excessively crushed which, results into formation of stone dust. The finer dust gets airborne and escapes as fugitive emissions. The emissions occur at the inlet chute, from the crushers' body and from the discharge chutes. These emissions occur at all types of crushers such as primary, secondary, and tertiary crushers in varying degrees.

**EMISSIONS DURING MATERIAL MOVEMENT AND TRANSFER:** The crushed stone is moved from one place to the other such as crusher to vibratory screen, screen to crusher, and again to storage piles, and between conveyor belts. During the movement and free fall during transfer of crushed stone, fine dust particles get airborne as fugitive dust emissions.

Emissions during vibratory screening operation: During vibratory screening of crushed stones and due to vigorous movement of the stones, the fine dust particles get loose and airborne and fugitive emissions occur. These emissions escape from the openings around the screen as well as at the bottom of discharge location.

**EMISSIONS DURING TRANSPORTATION:** During transportation of the mined stones as well as the crushed stone products, due to vehicular movement on non-metallic roads, fine dust settled on the ground gets airborne.

**SECONDARY EMISSION FROM STOCKPILES:** Generally the crushed stone is stored in open in heaps/piles. At times, when the wind speed is higher, the fine dust adhered to the stones is blown away from the stockpiles and gets airborne.

**EMISSIONS DURING LOADING OF CRUSHED STONE PRODUCTS:** The crushed stone products from the stockpiles are loaded into trucks or trolleys for dispatch. The loading is done either manually or with the help of conveyor belt. During loading, due to the movement of stones, the fine dust adhered to stone gets loosened up and gets airborne.

#### IMPACT OF SCUS ON THE WORKERS/EMPLOYEES

The following are major observations.

##### A BRIEF NOTE ON SOCIO ECONOMIC PROFILE OF THE RESPONDENTS

The age and sex of the workers is presented in table 1. Out of 98 respondents spread over 3 different locations namely Sixthmile, Tellaquary and Kailasagiri, the male and female workers are recorded by 56.12 percent and 43.88 percent.

TABLE - 1: AGE AND GENDER OF THE RESPONDENTS

Area	Age group of the respondents				Gender	
	<20	20-40	40-60	total	Male	Female
6 <sup>th</sup> Mile	6 (75.0)	4 (5.56)	6 (33.33)	16 (16.33)	9 (16.36)	7 (16.30)
White Quarry	2 (25.0)	12 (16.67)	2 (11.11)	16 (16.33)	10 (18.18)	6 (13.95)
Kailasagiri	-	56 (77.78)	10 (55.56)	66 (67.35)	36 (65.45)	30 (69.77)
Total	8(8.16) (100.0)	72(73.47) (100.0)	18(18.37) (100.0)	98(100.0) (100.0)	55(56.12) (100.0)	43(43.88) (100.0)

Source: Field survey. Note: Figures in the brackets indicate the percentage to total

About 8.16 percent of the respondents are young- under less than 20 years followed by 20-40 years and 40-60 years of age group (included too old) with 73.47 and 18.37 percent respectively. Majority of the respondents are located at White Quarry. The average age of the young children is 7 years.

As per the perception of the workers, illiteracy, ill health, low earnings forced to place their children in the profession. Nevertheless the participation level of child labour is insignificant even though the average size of their family is large. There is no variation between working house holds and non-CSU households in this regard.

It is observed from the Table-2 that 50 percent each of the workers in three sample areas belong to Backward Castes (BC) and Scheduled Castes (SC). The similar has also taken from non-SCUs households. There is no variation between working house holds and non-CSU households (NCSHs) regarding size of the family.

Education is the most vital instrument to rural of economic transformation in the society. In the sample it is found that many (46.94 percent) of the respondents are illiterate. The remaining workers have possessed primary (by 29.59 percent) and secondary education (12.24 percent). No person in the sample acquired technical qualification through formal institution. Thus, low standard of living due to vicious circle of poverty nonappearance of skill up gradation and illiteracy is also one of the major causes to tackle this unskilled work.

#### MIGRATORY NATURE OF THE WORKERS

It is found that numerous of the labourers have migrated from long distance and different places of the states like Kurnool, Prakasam, Salem (Tamilnadu) and Orissa which are faced low level of living standards lack of sufficient employment opportunities and regular income opportunities at their native places. The workers in the White/Tella quarry and Kailasagiri are migrants from Tamilnadu state and they are extremely young couples.

TABLE - 2: SOCIAL AND EDUCATIONAL STATUS OF THE RESPONDENTS

Area	Social group of the respondents			Literacy		
	BC	SC	Total	Illiterate	Primary	Secondary
6 <sup>th</sup> Mile (16)	8 (16.33)	8 (16.33)	16 (16.33)	7(43.75) (15.22)	7(43.75) (24.14)	2(12.50) (16.67)
White Quarry(16)	8 (16.33)	8 (16.33)	16 (16.33)	11(68.75) (23.91)	5(31.25)	0
Kailasagiri(66)	33 (67.34)	33 (67.34)	66 (67.34)	28(42.42) (60.87)	22 (33.33) (75.86)	10(15.15) (83.33)
Total(98)	49(50.0) (100.0)	49(50.0) (100.0)	98(100.0)	46(46.94) (100.0)	29(29.59) (100.0)	12 (12.24) (100.0)
Family size	4.3	5.4	4.6	-	-	-
Family size & literacy of non-SCUs members	4.2	5.1	4.2	45.11%	31%	23.89%

Source: Field survey. Note: Figures in the brackets indicate the percentage to total

### LIVING CONDITIONS

All the workers in the sample are living in Slums. They do not have even minimum facilities like safe drinking water, drainage, septic latrines and the surroundings seems to be very dirty. Only 37.7 percent of workers have had municipal water and the others taking unsafe/ polluted water resources and suffering with Water born diseases as accepted the fact by the concerned local Health Officials. Water problem is dismal in case of NCSHs. Due to lack of housing facilities and lack of income to pay for transport these workers prefer to live near to mining, stone cutting work sites. They live in very small unprotected thatched houses.

### ANNUAL INCOME OF THE WORKERS

The existing workers are classified in to 3 categories basing on their annual income levels and presented in table 2.it is concluded from the table that 50 percent of the workers are registered under Rs 10000-15000 in come group followed by 27.55 percent in Rs 15000-20000 income group and 22.45 percent are under income group of above Rs 20 thousand as per the study (table-2). *On an average, the annual income of the workers is more or less, Rs 14 thousand only.* This meager amount is not enough to attain at least comforts. *Meanwhile the annual income is recorded by Rs 25thousand in case of NCSHs.* More number of respondents of NCSHs is placed in the income group of Rs 20 thousand and above.

Wage loss is adding more woes to the workers. Nearly 44.3percent of the respondents are loosing Rs.200-400 per month as wage loss due to ill health. They are suffering wage loss during slack season and holidays. Workers are loosing 3-4 days job due to ill health in some weeks.

### FAMILY EXPENDITURE

As mentioned earlier, the workers are unable to reach the minimum family needs. Nearly 67.20 percent of the workers are spending between Rs. above 2000 per month and 27.9 percent workers are spending between Rs.1500-2000 per month (table-3). Of the total expenditure, major amount is allocated for non food items especially on health (up to 15-20 equaling average to Rs 1500) percent to the total expenditure). Moreover, many of the workers feel relaxation from physical strain while consuming liquor. This adds to their total expenditure i.e., an average of Rs.30-50 per a day. It clear from the study that expenditure of the respondents is more than their earning so as to illustrate income expenditure gap (IEG). Therefore, they have fallen to debt trap and depending on the money lenders, Quarry owners and self help groups (SHGs) to fill the IEG. It is very low level in case of NCSHs.

### MEDICAL FACILITIES IN THE STUDY AREA

RMP, PMP, Local clinics are sufficient in the Quarry area. Nearly 63.9 percent of the workers prefer to go to Private Medical dispensaries i.e., RMP, PMP, Local clinics. Only 36.1 percent are preferred to go to PHC or Community hospitals run by Govt. Distance (5-6Kms) and non-availability of proper medicines and negligence of staff are the major reasons to avoid them as complained by many.

TABLE – 2: ANNUAL INCOME OF THE RESPONDENTS

Area	Annual income			
	10000-15000	15000-20000	Above 20000	Total
6 <sup>th</sup> Mile	10(62.50) (20.41)	4(25.0) (18.18)	2(12.50) (9.09)	16(100.0) (16.33)
White Quarry	9 (56.25) (18.37)	3( 18.75) (13.64)	4 (25.0) (18.18)	16(100.0) (16.33)
Kailasagiri	30(45.45) (61.22)	20(30.30) (74.07)	16(24.24) (72.72)	66(100.0) (67.34)
Total	49(50.0) (100.0)	27 (27.55) (100.0)	22(22.45) (100.0)	98(100.0) (100.0)
Non-SCUs members (%)	36.5	24.5	39.0	(98)100.0

Source: Field survey. Note: Figures in the brackets indicate the percentage to total

TABLE -3 MONTHLY FAMILY EXPENDITURE (% OF RESPONDENTS)

Area	Total Monthly Family expenditure				Monthly Family expenditure on health			
	1000-1500	1500-2000	above2000	Total	Below 500	500-750	750-1000	Total
6 <sup>th</sup> Mile	66.7	47.1	24.4	32.8	29.8	100.0	-	32.8
White Quarry	33.3	11.8	12.2	13.1	12.3	-	100.0	13.1
Kailasagiri	-	41.2	63.4	54.1	57.9	-	-	54.1
Total (% to total 98)	4.9	27.9	67.2	(98)100.0	93.4	4.9	1.6	(98)100.0
Non-SCUs members(98)	3.9	22.0	62.0	100.0	75.0	13.0	1.2	100.0

Source: Field survey.

### HEALTH PROBLEMS OF THE WORKERS/EMPLOYEES

The major problem of the workers is aggravated by dust pollution at the work place which caused to ill health especially Lung disease like Asthma, T.B, Skin, Physical Handicaps, Eye effect and Ear, Water born diseases etc are quite common.

It is recorded in table-4 that 34.4 percent of the respondents complain that they are suffering from Lung diseases like Asthma, T.B., etc. This makes the workers to spend much of their low incomes on healthcare.



As many as workers wounds their hands, legs and on other parts of their body caused to manual Stone cutting, blasting activities without enough care. The pieces of stones hit the worker with great force and cause the wound. Enough precautions have to be taken by the workers with kind support from owners of these stone crushing units

TABLE - 4: HEALTH/NON-INCOME PROBLEMS OF THE RESPONDENTS

Area	% of respondents to their total faced Problem / Diseases						Type of hospital visiting	
	Lung	Skin	PHs	Eye	Ear	Water born	Govt	Private
6 <sup>th</sup> Mile	33.3	7.7	40.0	8.3	-	3.3	30.0	70.0
White Quarry	23.8	-	15.0	25.0	71.4	26.7	27.3	72.7
Kailasagiri	42.9	92.3	45.0	66.7	28.6	70.0	45.5	50.5
Total (% to total 98)	34.4 (35)	42.86 (42)	65.6 (64)	39.3 (39)	11.5 (28)	49.2	36.1	63.9
Non-SCUs members	17.5	31.33	41.45	28.0	2.0	45.9	54.0	46.0

Source: Field survey

Apart from the above organs Eyes are more exposed to stone dust and small pieces of stones. The lack of provision of goggles by the owners making workers' conditions miserable. Noise levels are more and consistent in and around the Stone Crushing sites. Continuous exposure to blasting, cutting, loading/unloading activities, aggravate the health problems especially ear problems of the workers.

About 49.2 percent respondents are exposed that they are suffering with water born diseases due to unsafe and polluted drinking water in Kailasagiri area, nearly 63.6percent of the respondents were made complaint in this regard. These problems are not significance in case of non-CSHs compared CSU workers.

#### LOW LIFE EXPECTANCE OF CSU WORKERS

The physical observations made in the sample area reveal that many have low life expectancy even lower to country's average i.e., 65 years. 34.4 percent have projected their life expectancy would be 55-60 years. 45.9 percent guessed it would be around 60-65 years among them. Only 1.6 percent workers are imagined more than 65 years but it is hard to find many older people in study area.

#### ROAD ACCIDENTS DUE TO POOR VISIBILITY CAUSED BY DUST POLLUTION

Road accidents are taking place near the stone crushing units but no complaint was lodged on the grounds of reduced visibility, in the sample area. As per the area police station, 38 deaths and 80 losses of limb cases were recorded during the last five years.

#### REPREHENSIBLE MANAGEMENT OF SCUS & ITS IMPACT

Many studies revealed that stone crushing units which violate norms and function near to highways and operate without proper dust reducing techniques because reduced visibility. The blowing winds of hot summer exaggerate the problem. Absence of wind breaking walls, well paved roads, sprinkling of water, plantation is clearly visible and can easily identify by any person. Pollute control board (PCB) officials, civil society are able to convince the unit owners to adopt cleaner production techniques like covering the crushers, conveyors, dumping arrangements but faulty, partial, neglected, half hearted implementation causing severe dust emissions.

Despite the denial by the Medikonduru Police statistics, many accidents could be the result of high dust pollution of stone crushing units. GAMANA -the NGO filed a petition in the Hon. High Court of A.P against the stone crushing units that violated establishment norms because the units are very near to highway.

The PCB, AIR Act, Environment impact assessment (EIA) for stone crushing units laid down many norms to abate pollution. But the partial implementation of PCB norms reason for Air Pollution around the village.

#### CONCLUSIONS

No doubt to say that the informal sector is the major source to employment opportunities. Crushing stone industry is one of the informal sectors which possible to establish at lower cost of production and contribute significantly in extend infrastructure. It is estimated that there are over 12,000 stone crusher units with annual turnover of US\$ 1 billion. The sector is estimated to be providing direct employment to over 500,000 people engaged in various activities such as mining, crushing plant, transportation of mined stones and crushed products etc. but the Crushing stone industry has criticism as polluting the environment. The impact of SCUs on socio-economic conditions differ than NCSHs. Interestingly, it is generally expect that the socio economic conditions would be better than the others. But it is reverse in case of CSI. Low income, ill health, etc are common problems of the workers compared to non-NCSHs in the study area.

#### POLICY IMPLICATIONS TO BALANCE THE SCUS, WORKERS AND ENVIRONMENT

The main problem in containing the dust pollution from stone crushing industry units seems to be the improper implementation of PCB norms by the units and less capable PCB machinery which is able to neither measure nor contain the dust pollution. The following measures can be positively acts in this regard.

- PCBs should be well equipped to estimate the pollution at regular intervals. Other wise, absence of proper equipment to measure the pollution level, giving free hand to industry owners can pollute without any fear.
- More coordination among different Govt. agencies, departments is required to supervision the local industries in controlling pollution and as noticed PCB.
- Corruption, political interference, red-tapism in dealing of environmental aspects should be brought down to zero level. It may be possible through strict Punishment to the violators.
- Various options of low cost, recycled, pollution free technologies have to be made available by the Government to the unit owners to adopt them easily. Govt. should provide more subsidies to buy eco friendly technology.
- Fly ash bricks can be used to construct High wind breaking walls around stone crushing units.
- Van samrakshan Samithis (VSS) and NSS units can be mobilized to plant and protect more saplings around the stone crushing units.
- Stone crushing units must be taxed heavily on account of pollution.
- Industry owners by forming clusters should tap renewable energy resources to produce power.
- The NGOs, researchers, common citizen, and media must be more vigilant and active in containing the pollution and in supporting the concerned authorities.
- Management should provide ownership to the workers of the stone quarry. It helps the workers to earn more and improved economic conditions and feel response regarding the maintenance and development of the units.
- The workers safety' should also mandatory of the owners of stone crushing units. Sufficient compensation has to be paid to the victims.
- The living standards, education, health facilities for the workers have to be improved to a large extent. These measures can useful to the SCUs, works and to control pollution at some extent.

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