

# Evaluating the perception of mining engineers towards corporate social responsibility integrated with engineering operations in Indian coal mining industry

*Corporate social responsibility (CSR) has been coherent with normal workings of Indian coal mining industry statutorily in response to the statutory mandate and international agenda of sustainable development. The mining engineers mainly formulate the CSR activities and are also responsible for the effective implementation in the field. This paper evaluates the perception of mining engineers in Indian coal mining sector towards CSR and its process of implementation. In this paper a qualitative research has been conducted to assess higher as well as lower level mining engineers. Results of this qualitative research indicated that mining engineers at higher positions in the organisation have more accurate perception about CSR than mining engineers at lower levels but a large proportion of mining engineers at all levels need further knowledge enrichment. The willingness to learn and gain more knowledge about CSR found from the survey has drawn a bright future for CSR integration in engineering process.*

**Key words:** Corporate social responsibility, coal mining industry, mining engineers, sustainability, societal obligation.

## Introduction

Coal mining in India has a long history of 240 years. Presently coal is one of the prime source of energy in India and is one of significant contributors to the country's gross domestic product (GDP). The demand of coal in the country is increasing every year and there persists a significant gap between demand and supply in the country. Fig.1 depicts the demand and supply scenario in the country. Most of the coal produced is consumed in generating

electricity in the country and electricity consumption per capita has a strong correlation to social development indices and in turn to economic indices. Fig.2 presents the dependence of coal in country power generation as compared to other sources of energy in the country. Increasing electricity consumption per capita can directly stimulate faster economic growth and indirectly achieve enhanced social development for low and medium human development countries (Leung and Meisen 2005). From Figs.1 and 2 the importance of coal can be felt and this is the reason that coal mining industry is of high value and importance in the growth and development of the country. India is also bestowed with large deposits of coal occurring at different depth with variation in grade. Table 1 tabulates the coal reserve in the country at different depth. India being one of the largest economies in the world, the sustainability of Indian coal mining industry bears global importance.

The coal mining industry, being one of the most responsible developers of the nation, is likely to face greater consequences as not only, its spread account for several provinces of the nation and dealing with a large number of people but there are several negative effects of the industry on the environment and the people in the neighborhood like loss of fertile land, deforestation, loss of biodiversity, water pollution, air pollution etc. In view of regulatory provisions, international requirements and societal pressures as well, the industry is not only continuously modifying its methods of working and upgrading mining technology but also integrating CSR in its engineering operations in generic ways to mitigate its impact on environment and society. CSR is the modern day term but was practiced since ancient times such as the expectations 'Sarve bhavantu sukhinah, sarve santu niraamayah, sarve bhadraani pashyant, maa kaschid dukhamapnuyat' (Brihadaraanyaka Upanishad 1.4.14) i.e. May all be happy, may all be without disease; may all look for well-being of others; may none have misery of any sort' was there in India in 800 BC (Phillips 2009). The perception of the coal mining sector towards the CSR is of prime importance and to analyse the perception of mining engineers at different

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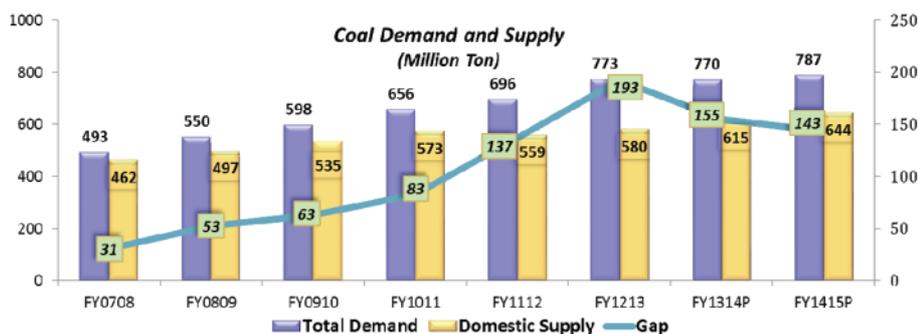


Fig.1 Coal demand and supply in India (Ministry of Coal, GOI, 2015)

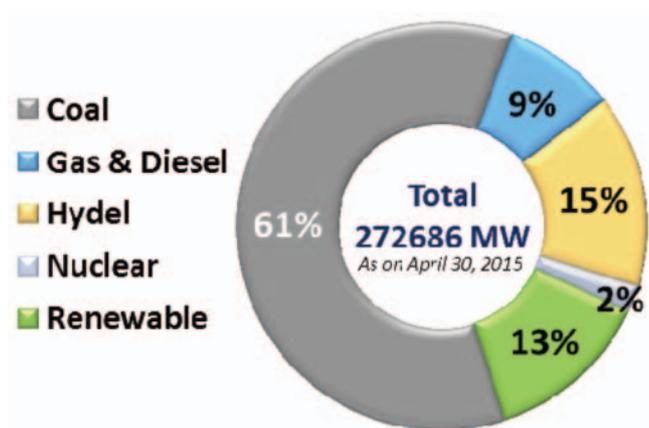


Fig.2 Installed power capacity of India (Central Electricity Authority, Ministry of Power, GOI, 2015)

2011). It can be split into two processes (Bernstein 2013); firstly – processing sensory input which transforms low-level sensory information to higher-level information, and secondly – processing which is connected with person’s concept and expectations (knowledge), and selective mechanisms (attention) that influence perception. According to the Psychologist Jerome Bruner, 1949 who developed a model of perception, in

the process of formation of opinions, people go through the three stages:

- (i) When they encounter an unfamiliar target they are open to different informational cues and want to learn more about the target
- (ii) Then, they try to collect more information about the target. Gradually, they encounter some familiar cues which help them categorize the target
- (iii) Finally, the cues become less open and selective. They try to search for more cues that confirm the categorization of the target. They also actively ignore and even distort cues that violate their initial perceptions. Their perception becomes more selective and they finally paint a consistent picture of the target. Now, this is the perception-in-action.

Many philosophers write that the purpose of perception is knowledge, but evolutionary psychologists hold that its primary purpose is to guide action (Gaulin and McBurney 2001). It is the individual’s perception of social structure that influences behaviour, attitudes, evaluations, and decisions and not the structure itself (Carley and Newell 1994). Perception is a requisite property of animate action such that without perception, action would be unguided and without action, perception would serve no purpose (Gibson 2002). Numbers of factor (viz. the perceiver, the target and the situation) operate to shape and sometimes distort perception (Fig.3). Out of the three factors that are responsible for shaping or distorting the perception, two factors are constant viz. the perceiver and the situation; the target (CSR) is the independent variable, considering it also a constant at

levels in the management this study has been conducted. Proposed outcome construct of interest in the research is evaluation of perception towards CSR. The subject of CSR, independent variable of the construct, has been broken down into a number of aspects like definition, objective, activities, implementation procedure, outcome, reporting, contemporary international expectations, statutory provisions in the country etc. and then grouped in two frames to ascertain the perception of the mining engineers towards CSR (meaning, objective, activities taken and implementation) and highlight the area that has to be improved.

### Perception

Perception is the organization, identification, and interpretation of sensory information in order to represent and understand the environment (Schacter, Gilbert and Wegner

TABLE 1: THE DEPTH-WISE AND CATEGORY-WISE BREAK-UP OF INDIAN COAL RESOURCES\* (IN MILLION TONNES)

Depth range (m)	Proved	Indicated	Inferred	Total	% share
0-300	100607.70	68705.34	9618.66	178931.70	58.36
300-600	14931.48	59853.43	15953.29	90738.20	29.60
0-600 (for Jharia only)	13760.73	451.69	0.00	14212.42	4.64
600-1200	2314.16	14230.64	6168.44	22713.24	7.40
Total	131614.07	143241.10	31740.39	306595.56	100.00

(\*Central Mine Planning & Design Institute, Coal India Ltd, India)

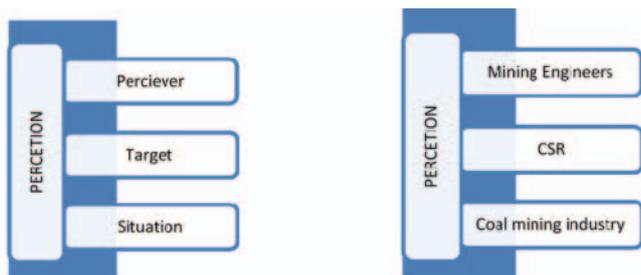


Fig.3 Factors of perception

particular time for evaluation of dependent variable i.e. the perception.

The construct in the paper will evaluate the assumptions, knowledge, experience and expectations of mining engineers towards CSR in order to evaluate the accuracy of their perception for the subject study. This perception decides the behaviour and action of individual towards the target. Managers' perceptions of social responsibilities of businesses have been investigated through researches in recent past (Quazi 2003; Lindgreen, Swaen, and Johnston 2009; Pedersen 2010).

### CSR: background and concept

The term CSR in academic literatures date back 1930s (Berle 1931; Dodd 1932). By late 1990s, the concept was fully recognised by the academicians, politicians, institutions and researchers across the globe who started supporting it and as a result, whereas in 1977 less than half of the Fortune 500 firms even mentioned CSR in their annual reports, by the end of 1990 approximately 90 per cent Fortune 500 firms embraced CSR as an essential element in their organisational goals and actively promoted their CSR activities in annual reports (Boli and Hartsuiker 2001). In the initial stages of CSR research - often referred to as social responsibility, the literatures were primarily at the institutional level with the discourse being around the role of the firm in society (Howard 1953; Davis 1960; Schwartz and Carroll 2003; Lee 2008; Post and Preston 2012). Carroll (1979) defined CSR as the economic, legal, ethical, and discretionary expectations that society has of organizations at a given point in time. Over thirty-five definitions of CSR have been proposed (Dahlsrud 2008; Matten and Moon 2008) by 2008 but CSR related researches, debates and discussions in many contexts still continue. The importance attached to CSR may differ in each country (Idowu and Filho 2009), the concept of CSR adopted in one country may perhaps be of little or no significance in another. Matten and Moon (2008) studied, why forms of CSR differ among countries by comparing United States with Europe and identified differences like the power of the state, governments engagement in economic and social activity, financial sources, education and labour systems, environment legislations. Issues such as poverty, inability to service and repay international debt, illiteracy, HIV/AIDS, the absence of clean

running water and electricity, fraud, bribery and corruption are typical of the underdeveloped world whilst other issues such as global warming, terrorism, money laundering, corporate and individual philanthropy, CO<sub>2</sub> emissions reduction might be issues that affect all nations but are publicized by the more industrialized ones (Idowu and Filho 2009). Due to the reason, a single widely accepted definition of CSR has not been established (Freeman et al. 2010). Few of the definitions of CSR that have been widely accepted in the world are:

Carroll (1991) described CSR as “a multi-layered concept that can be differentiated into four interrelated aspects - economic, legal, ethical and philanthropic responsibilities”. Carroll presented these different responsibilities as consecutive layers within a pyramid, such that “true” social responsibility requires the meeting of all four levels consecutively.

Kotler and Lee (2005) defined CSR as “a commitment to improve community well-being through discretionary business practices and contributions of corporate resources”.

The European Commission put forward a new definition of CSR as “the responsibility of enterprises for their impacts on society”. The EU required – respect for applicable legislation, and for collective agreements between social partners, is a prerequisite for meeting that responsibility. To fully meet their corporate social responsibility, enterprises should have in place a process to integrate social, environmental, ethical, human rights and consumer concerns into their business operations and core strategy in close collaboration with their stakeholders, with the aim of maximising the creation of shared value for their owners/shareholders and for their other stakeholders and society at large (Europejska 2011).

As stated earlier, the definitions of CSR may differ, but there is a consensus on some common principles such as

- ◆ CSR is a business imperative.
- ◆ CSR is an application of sustainable development.
- ◆ CSR is a way to manage business.

### CSR: Indian context

In context to India, the evolution of CSR followed a chronological evolution of four thinking approaches (Kumar, Murphy and Balsari 2001)

- (i) Ethical Model (1930 -1950): Promotion of “trusteeship” that was revived and reinterpreted by Mahatma Gandhi. Under this notion the businesses were motivated to manage their business entity as a trust held in the interest of the community. The idea prompted many family run businesses to contribute towards socio-economic development.
- (ii) Statist Model (1950 -1970s): Mixed and socialist kind of economy, reinterpreted by Pandit Jawahar Lal Nehru. The important feature of this model was that

the state ownership and legal requirements decided the corporate responsibilities.

- (iii) Liberal Model (1970s -1990s): Confined to economic bottom line, this implies that it is sufficient for business to obey the law and generate wealth, which through taxation and private charitable choices can be directed to social ends.
- (iv) Stakeholder Model (1990s - present): The model came into existence during 1990s as a consequence of realisation that with growing economic profits, businesses also have certain societal roles to fulfil. The model expects companies to perform according to “triple bottom line” approach.

While looking into the legislative part of CSR in India, a thorough effort has been put by the Government for integrating CSR in all activities of companies in true sense and spirit for protection and improvement of environment and community expectations. The Department of Public Enterprises (DPEs), Government of India defined CSR (DPE Guidelines 2010) as 'a philosophy wherein organizations serve the interest of society by taking responsibility for the impact of their activities on customers, employees, shareholders, communities and the environment in all aspects of their operations'. In line with this definition and others as mentioned earlier, the study adopted the definition as follows: Corporate Social Responsibility is the natural obligation of corporate beyond its usual duty to integrate activities of mitigating the negative impact of its business on environment and communities in its all operations in line with sustainable development for mutual benefits.

#### **CSR and Indian coal mining industry**

Coal mining industry in India mostly (90%) is public sector enterprise (PSE), and so being part of the state, has a moral responsibility to play an active role in discharging the social obligations endowed on a welfare state, subject to the financial health of the enterprise (findings of Committee of Public Undertakings 1992). The industry was required to formulate its business plan under CSR integrated with social and environment concerns (DPE Guidelines 2010). The government became more specific in 2013 and asked the industry to formulate its policies with a balanced emphasis on all aspects of CSR and sustainability with regard to its internal operations, activities and processes, as well as in its response to externalities. Further, the industry has to act in a socially responsible manner at all times such that any business activities conducted shall be beneficial to both, business and society (DPE Guidelines 2013). A section 135, exclusively for CSR was brought in Companies Act in 2013. The Act was supplemented with Companies (CSR) Rules in April 2014 and fresh DPE Guidelines, 2014. Through these legislations, the Government of India made it compulsory for companies to participate in the process of development of the society through CSR, and became the first country to

mandate spend on CSR activities through statutory provisions. These legislations provide complete framework for CSR in organisations like compulsory expenditure of 2% of net profit in CSR activities, composition of CSR committee, framing of CSR policy, monitoring of CSR, selection of activities under CSR, preference to local area, execution of activities and reporting etc. A list of activities which may be undertaken by the companies in their CSR programme has been provided in Schedule-VII of Companies Act 2013. Vide DPE Guidelines, 2014, the government stated that CSR and sustainable development are treated as complementary and directed the industry not to overlook the larger objective of sustainable development in the conduct of business and in pursuit of CSR agenda and stressed that the industry shall not lose sight of its social and environmental responsibility and commitment to sustainable development even in activities undertaken in pursuance of their normal course of business, and the philosophy and spirit of CSR and sustainability should be understood and imbibed by the employees at all levels and get embedded in the core values of the company, and preference should be given to the 'local area' in selecting the location of their CSR activities. In response to the international expectations and the legislations, the coal mining industry in India put CSR activities in practice for contributing to the well-being of the environment, the communities and the society it affects. As per the Report of Committee on Public Undertakings (2014-15), Ministry of Coal, Government of India, budget allocation against CSR activities and actual expenditure of Coal India Limited in 2013-14 was Rs.4,743.6 million and budget allocation for the year 2014-15 was Rs.4,716.5 million. The budget allocation against CSR activities and actual expenditure of various subsidiaries of Coal India Limited in 2013-14 and budget allocation for the year 2014-15 has been shown in Table 2. The CSR activities undertaken by the industry consisted mainly:

- (i) Education – Financial assistance to schools, scholarship, adult literacy, bicycle to needy girl students etc.
- (ii) Water supply including drinking water – Installation and repair of hand pumps, digging wells boreholes, laying pipelines.
- (iii) Health care – Organizing health awareness camps on AIDS, TB, leprosy, diet, nutrition, family planning, facilities of mobile medical vans etc.
- (iv) Social empowerment – Training and Development in various fields such as welding, fabrication, tailoring, farming etc. for weaker section of the community for self-employment.
- (v) Sports and culture – Promotion of sports of different events in coalfields including nearby villages.
- (vi) Infrastructure support – Construction of community buildings, roads, culverts, repairing and supply of furniture for educational institutions.

TABLE 2: MONETARY ALLOCATION AND EXPENSES OF VARIOUS SUBSIDIARIES OF CIL\* (INR IN MILLIONS)

Company	2009-10		2010-11		2011-12		2012-13		2013-14		2014-15
	Budget	Spent	Budget	Spent	Budget	Spent	Budget	Spent	Budget	Spent	Budget
ECL	22.5	24.9	50	47.5	165	131.4	238.9	94.2	293.5	219.7	379
BCCL	27.5	17	137.5	31.5	145	55.3	236.3	74.3	305	200	300
CCL	80	78.6	256.9	109.8	538.8	110	477.2	136.6	264.2	269.4	480
WCL	44.7	28.8	230	71.2	558.2	78.6	406.7	209.6	294.6	238	79.5
SECL	100.1	74.3	540	157	1464.4	176.6	1817.9	466.3	639.4	439.1	1290
MCL	96	149.2	520.4	534.5	820	144.7	733.6	255.6	1017.2	1114.8	1124.8
NCL	62.3	23.5	360	43.5	934.2	92.5	957.3	176.4	489.9	397.2	802.8
Others (NEC, CMPDIL, CIL)	5	5.1	528	89.2	907.7	30.9	1089.5	82.5	1439.8	1435.2	260.4
Total	438.1	401.4	2622.8	1084.2	5533.3	820	5957.4	1495.5	4743.6	4093.7	4716.5

\*Ministry of Coal, Govt. of India

- (vii) Generation of employment – By setting up cooperative societies, construction of shopping complex etc.
- (viii) Relief of victim against natural calamities
- (ix) Adoption of village – For carrying out activities like infrastructure development such as providing solar light, windmill, construction of road etc.
- (x) Financial assistance to NGOs – For under taking different activities towards upliftment of the under privileged backward, physically and mentally challenged children.
- (xi) Financial support – For organizing medical camps, free consultation, distribution of medicines, medical awareness for under privileged and slum dwellers in association with local community for education, health and nutrition by creating needy children and women friendly communities.
- (xii) Assistance for creating employment opportunities to the visually impaired in IT sector.
- (xiii) Various activities towards protection of environment.
- (xiv) Financial support for repair and maintenance of Holy Child Home and provision for water filtering systems for the welfare home for children of life term prisoners and sex workers.

CSR budget of Coal India for 2014-15 is Rs.4716.5 million out of which 50% has been earmarked for sanitation project under 'Swachh Vidyalaya Campaign' of India. Contributions to the three funds viz. Prime Minister's Relief Fund, Swachh Bharat Kosh and Clean Ganga Fund currently notified under the 2013 Act are to be recognized as CSR activity.

#### Lacunae in the CSR implementation

Coal mining raises a number of environmental challenges, including soil erosion, dust, noise and water pollution, and impacts on local biodiversity. Steps are taken in modern coal mining operations to minimise these impacts. Abundant cheap

and highly polluting energy supplies, while providing essential inputs for economic growth in the short term, result in unsustainable local, regional, and global environmental and health effects over the medium and long term, as seen throughout the industrial world and now increasingly in China and India (Klugman2011).The legislations require CSR to be integrated with all business activities and to be conducted in such a manner that is beneficial to both, the business and the society. The Indian coal mining industry put efforts and spent money for CSR but there appears a requirement to dress up CSR practice in the industry as a business discipline in a manner that every initiative should deliver business results, a requirement to align the industry's environmental and social activities with its business purpose and values, a requirement to make CSR an integral part of coal mining engineering. From Table 2 it can be deduced that the spending is less than the allocated budgetary head which indicates the non-integration of CSR activities in the company system as a regular practise. To make CSR an integral part in Indian coal mining industry the employees especially mining engineers at higher as well as lower level have to adopt the philosophy and spirit of CSR and sustainability. The concept should be understood and imbibed at all levels and should be highlighted in the core values of the company. The international expectations and legislative requirements are clearly spelt in respect of CSR but its success largely depends on the accuracy of perception the managers bear towards CSR.

The efforts and the expenditure made by the industry in view of CSR can only be meaningful if managers of the industry perceive accurately the CSR and its objectives as well as its implementation process. The direction and quality of decisions into the subject depends on accuracy of perception of the subject. The perception level of the mining engineers towards CSR has never been evaluated in Indian coal mining industry, and a feedback is considered essential for identification of improvement areas. It is the inaccurate perception that makes the temporal world a real one, which

leads to disturbances and even wars. All that exists is a perception and it is due to perception that a well-established fact seems to be irrelevant sometimes. How one perceives a subject or situation determines his reaction, his behaviour, his decision and so the process, the engineering and the outcome.

### **Design and methodology**

To evaluate the subject 'CSR', it has been considered as an independent variable. To analyse the independent variable different aspects of CSR has been taken into consideration such as definition, objective, activities, implementation procedure, outcome, reporting, contemporary international expectations, and statutory provisions in the country. The outcome has been grouped in two main frames that how the mining engineers in coal sector perceives

- ♦ CSR: meaning and objective (Measure 1: Appendix A),
- ♦ CSR: activities and implementation process' for translating CSR into action at the ground level (Measure 2: Appendix B).

Well-established scale development procedure (Netemeyer, Bearden and Sharma 2003) was followed for generation of a comprehensive item pool. Items for the measures were initially developed using a deductive approach for generating items based on the literature and guiding definition of CSR and implementation procedure as per Indian law and international norms presented earlier in this paper fitting in the industry and the society keeping the respondents in view. Then, feedback and modifications of items from experienced scholars in the area were obtained resulting in an initial set of fifty four items to consider for inclusion in the measure. Next, the list of items was examined by a panel of seven experts comprised mining engineering experts, management scholars, business operators and society scholars who rated the fit of each item to our guiding subject (Hinkin 1995). After approval from the panel, only those items were taken for further considerations which were rated with a mean score of three or higher, eliminating twenty nine items (54%) and the measure was modified and reduced to twenty five items in two groups, one for nine items and another with sixteen items. Thus, the content validity of the proposed instrument was checked that the content of its items reflects the intended variable. For checking the construct validity of the instrument, six high level CSR professionals of the coal mining industry were tested and then six junior level mining engineers were also tested with the same instrument. The hypotheses naturally was that high level CSR professionals will show more accurate perception than that of junior level mining engineers. And, the hypothesis was found accepted from the result of tests. After confirming the content validity and the construct validity, two separate pilot studies were undertaken using Likert scale options ranging from strongly disagree to strongly agree. The

first pilot study to further improve the measure based on both quantitative results as well as feed-back from participants was conducted with a group of twenty engineers from a coal mining company namely BCCL. After the study, two questions were removed, and wording of four questions was modified without substantially changing the content. Finally, the instrument was developed having two measures, the first containing eight items and the second containing fifteen items. The final items included in the Measures 1 & 2 are shown in Appendixes A and B. In order to check internal consistency, Cronbach's coefficient alpha was calculated. Cronbach's coefficient alpha was found to be 0.73 and 0.86 for the first measure and the second measure of the instrument respectively transpiring the instrument well. Cronbach's coefficient alpha is a reflection of how well the different items complement each other in their measurement of different aspects of the same variable or quality and a correlation coefficient 0.70 is considered to be good.

### **Procedure**

Out of the eight subsidiary companies of CIL, two companies were considered as representative cluster sample for survey namely Eastern Coalfields Limited (ECL) and Bharat Coking Coal Limited (BCCL). For the accessible population of mining engineers in ECL and BCCL, the sampling frame was obtained from the records of the companies; the contact details of mining engineers were obtained from the websites of the companies. Sample size of 510 out of large population of mining engineers was taken by a stratified random sampling. The two companies sampled consisted of 14 and 12 separate areas (cluster) of collieries. As samples were taken from each area in almost fixed proportion, and as sampled two companies are representatives of coal mining industry in India because the engineering operations and technology adopted in these companies are similar as in other companies and areas of operations are also equivalent, the sample was approximately fair to prove the external validity and so for generalisation of the study in Indian coal mining industry. In coal bearing and mining areas, the issues are all similar. The respondents contain two groups, one of mining engineers at higher level positions in the industry i.e. manager and above, and another of mining engineers at lower level positions i.e. below manager level who may become manager in future. The respondent group (R) was measured for both the measures at same time. Responses of both the two groups were collected at the same time but segregated afterwards.

Self-selected programme participants were made conversant with the subject and the instrument. They started visiting individually different areas of ECL and BCCL and contacting mining engineers (while off-duty) whose names were provided to them in area-wise and mine-wise lists. Participants simply narrated the purpose of visit, handed over the instrument sheet and asked them to tick the options in the instrument as Strongly Agree (SA), Agree (A), Neutral

(N), Disagree (D), and Strongly Disagree (SD). The survey was conducted for over a year time frame under proper supervision of the authors. The generated data was compiled and analysed.

### Results

Responses of higher and lower level mining engineers towards the Measures 1 (Appendix A) and 2 Appendix B) are presented in Tables 3 and 4. Perception analysis of the engineers are shown in Figs.4 and 5. Percentage of higher level engineers who strongly disagreed to defined CSR and its objectives was 6% and to defined activities undertaken in CSR and their implementation process was 12%; in lower level engineers these percentages were 16% and 12% respectively. Percentage of higher level engineers who disagreed to defined CSR and its objectives was 17% and to defined activities undertaken in CSR and their implementation process was 18%; in lower level engineers these percentages were 20% and 18% respectively. Percentage of higher level engineers who remained neutral to defined CSR and its objectives was 33% and to defined activities undertaken in CSR and their implementation process was 33%; in lower level engineers

these percentages were 32% and 34% respectively. Percentage of higher level engineers who agreed to defined CSR and its objectives was 22% and to defined activities undertaken in CSR and implementation process was 18%; in lower level engineers these percentages were 18% and 17% respectively. Percentage of higher level engineers who strongly agreed to defined CSR and its objectives was 22% and to defined activities undertaken in CSR and implementation process was 19%; in lower level engineers these percentages were 14% and 19% respectively. If we look at the combine perception of higher and lower level mining engineers for both the measure we can say that the majority of the engineers agree or strongly agree with 36% for both the measures. These result reflects that majority of mining engineers bear accurate perception towards CSR but still there is tremendous scope for the improvement. The percentage of mining engineers who disagree and strongly disagree is still stands very high and this may be the possible reason for the lack in CSR planning and implementation by the industry. The accuracy of perception for around 34% mining engineers who remained neutral can be improved with little efforts of awareness programme and training by the CSR experts by the

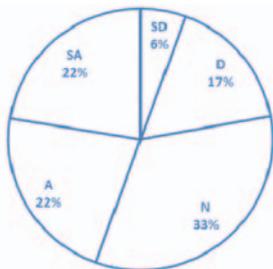
TABLE 3: RESPONSES OF MINING ENGINEERS TOWARDS MEASURE 1

Higher level								
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Strongly disagree (SD)	11	10	16	23	23	2	1	3
Disagree (D)	29	35	4	135	40	2	1	18
Neutral (N)	62	86	162	16	56	7	3	139
Agree (A)	40	52	8	21	72	102	30	26
Strongly agree (SA)	57	16	9	4	8	86	164	13
Lower level								
Strongly disagree (SD)	47	42	77	97	106	5	13	17
Disagree (D)	67	96	39	164	87	10	11	18
Neutral (N)	108	111	177	41	78	59	6	225
Agree (A)	43	51	13	8	40	155	87	41
Strongly agree (SA)	46	11	5	1	0	82	194	10

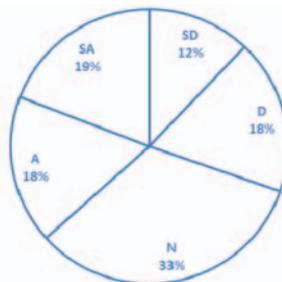
TABLE 4: RESPONSES OF MINING ENGINEERS TOWARDS MEASURE 2

Higher level															
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
Strongly disagree (SD)	11	26	20	63	57	4	2	10	8	22	24	50	56	5	3
Disagree (D)	25	67	33	105	30	9	0	6	7	76	40	111	26	4	5
Neutral (N)	81	86	139	16	93	13	4	139	59	93	124	23	88	15	13
Agree (A)	37	13	2	12	17	94	70	41	59	3	7	12	20	76	60
Strongly agree (SA)	45	7	5	3	2	79	123	3	66	5	4	3	9	99	118
Lower level															
Strongly disagree (SD)	23	29	33	99	88	5	6	18	5	23	43	70	86	8	11
Disagree (D)	51	92	56	165	42	6	11	7	21	113	51	151	31	8	12
Neutral (N)	97	165	205	26	145	18	13	216	109	159	193	62	146	22	18
Agree (A)	70	14	11	17	32	132	98	62	80	10	13	18	38	121	93
Strongly agree (SA)	70	11	6	4	4	150	183	8	96	6	11	10	10	152	177

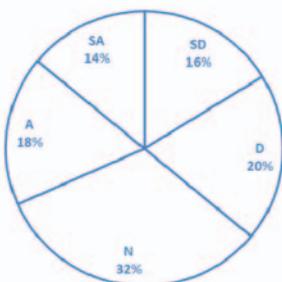
Response of higher level towards measure 1



Response of higher level towards measure 2



Response of lower level towards measure 1



Response of lower level towards measure 2

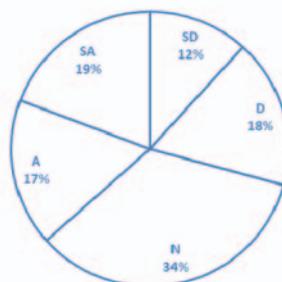
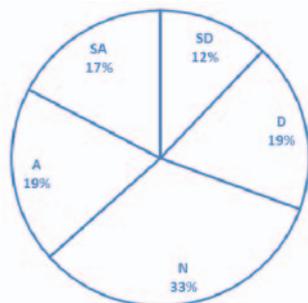


Fig.4 Responses of higher and lower level mining engineers

Combined response of engineers towards measure 1



Combined response of engineers towards measure 2

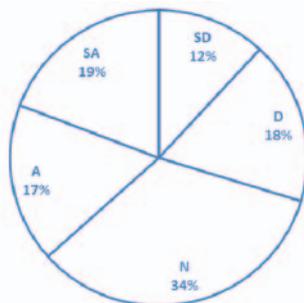


Fig.5 Combined responses of higher and lower level mining engineers

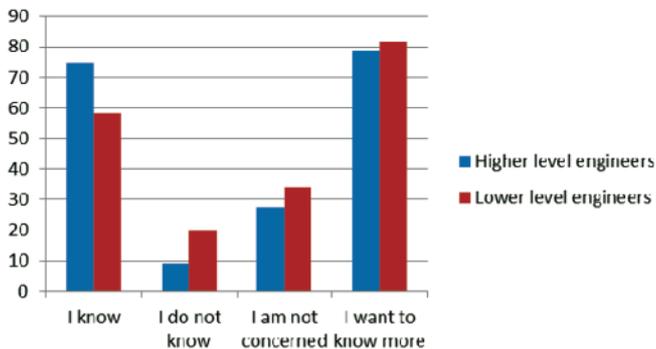


Fig.6 General view of mining engineers towards CSR

management. While looking at the responses from the mining engineers for each question in measure it was observed that in few areas both the higher and lower level engineers either 'disagree' or 'strongly disagree'.

During the survey, the general view of mining engineers towards CSR was also shared through a set of four questions instituted with the two measures of the instrument. The questions were regarding all items of the instrument individually that is (i) I know (ii) I do not know (iii) I am not concerned, and (iv) I want to know more. The data was analysed and the results shown in Fig.6 shows that 75% of higher level engineers confirmed that they know what CSR means and its objectives but for lower level engineers this confirmation was only 57%. 74% of higher level engineers expressed that they were well aware of the activities in CSR being undertaken and the implementation process but this percentage in lower level engineers was 59% only. 04% of higher level engineers expressed they do not know what CSR means and its objectives and for lower level engineers this was 19%. 15% of higher level engineers expressed that they did not know the activities in CSR being undertaken and the implementation process, this percentage in lower level engineers was 21%. 27% of higher level engineers expressed they were not concerned with CSR, this percentage for lower level engineers was 34%. 79% of higher level engineers wished to know more about CSR; this percentages in lower level engineers was 82%.

It was surprising that 30% of mining engineers expressed that they were not concerned with CSR whereas the legislation requires that the philosophy and spirit of CSR and sustainability should be understood and imbibed by the employees at all levels and get embedded in the core values of the company. This alarming situation requires urgent attention, and to be addressed by the industry. The percentage of mining engineers who expressed willingness to learn and gain more knowledge about CSR was above 80%. This transpires that there is wide acceptability of the subject and indicates a bright future for CSR integration in mining engineering operations.

### Discussions and conclusions

The research results have provided interesting findings on the perception of mining engineers towards CSR. Mining

engineers in overall bear significantly accurate perception towards CSR but efforts are required to increase the accuracy level because the legislative requirements and international expectations are much more demanding in order to meet the sustainable development goals. While looking at the responses from the mining engineers for each question in measure it was observed that in few areas both the higher and lower level engineers either disagree or strongly disagree. This requires necessary attention for increasing the perception level of engineers towards CSR. The following significant outcome has been observed which need urgent attention by coal industry in the country.

Measure 1: Q4: Most of the CSR activities are undertaken in local areas in and around the mining fields: The responses observed reflects that both higher and lower level engineers either strongly disagree or disagree with the instrument. Although, this is required by legislation that local area where the industry operates are to be given priority while selecting the CSR activities to be undertaken, but the industry lacks.

Measure 2: Q4: Regular dialogue is held with stakeholders for CSR activities to be taken up and before taking up a CSR activity, need based Baseline survey is done: Although, this is required by legislation that regular dialogue with stakeholders should be done with a view to understand the needs of stakeholders by taking them at face value, to understand the local context and culture, the stakeholders should decide the modus operandi, but it appeared that industry lacks at this front.

Measure 2: Q5: CSR activities are normally initiated by Area CSR Committee and taken up after approval of HQ CSR Committee: CSR initiatives should arise from the fields of operation of the industry. It appeared that CSR activities are initiated from top level.

Measure 2: Q12: The activities covered under CSR practice include environmental sustainability activities: The environmental profile of the coal mining industry in India is considered good in fact, but the survey result indicated that the industry lacks in taking up environmental sustainability measures under CSR.

Normally, the industry's CSR performance is measured by its financial expenditure made on account of CSR activities, only this will not serve the purpose but satisfaction to stakeholders on economic, environmental and social front is essential. The CSR initiatives if not remain mutually beneficial to both, the society and the industry, lose charm of practicing engineers distorting their perception. It is essential to integrate CSR in all engineering operations in right spirit and this draws the scope of further research as evaluation of attitude of mining engineers towards CSR and steps to improve the perception level.

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Appendix A

MEASURES 1

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PERCEPTION CSR: MEANING AND OBJECTIVE

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- Q1 In engineering operations of my company, CSR is well integrated to supplement international goals for sustainable development.
  - Q2 CSR is a holistic approach in business strategy of my company towards economic, environmental and social development for addressing social and environmental impacts of its business.
  - Q3 The CSR policy document of my company includes well the sustainable development commitment.
  - Q4 Most of the CSR activities are undertaken in local areas in and around the mining fields.
  - Q5 CSR activities are continuously improving the quality of life especially to those who are deprived in locality.
  - Q6 All employees at every level of our company are aware with CSR and sustainability measures.
  - Q7 Surplus generated through CSR projects is a profit to beneficiaries and never a direct profit to our company.
  - Q8 CSR activities are beyond the normal engineering operations of the company but essentially undertaken and mutually beneficial to the industry and society. I like it.
-

## MEASURES 2

## PERCEPTION CSR: ACTIVITIES AND IMPLEMENTATION PROCESS

- Q1 My company spends at least 2% of the net profit every year in CSR activities essentially useful, not just for compliance of statute.
- Q2 Most of the CSR activities are undertaken in form of engineering projects entailing the planning the stages of execution, fixing targets at different milestones and time span for desired output.
- Q3 A CSR Committee headed by Directors in my company formulates and recommend the activities under CSR and monitor the CSR policy.
- Q4 Regular dialogue is held with stakeholders for CSR activities to be taken up and before taking up a CSR activity, need based Baseline survey is done.
- Q5 CSR activities are normally initiated by Area CSR Committee and taken up after approval of HQ CSR Committee.
- Q6 Annual CSR Report is displayed on the company's website for information to stakeholders. This has improved the image of my company in public.  
The activities covered under CSR practice of my company include following
- Q7 Eradicating extreme hunger and poverty
- Q8 Promotion of education in the locality especially for poor and girls
- Q9 Promoting gender equality and empowering women
- Q10 Reducing child mortality and improving maternal health, Combating HIV, AIDS, malaria and other diseases
- Q11 meeting the national development agenda like safe drinking water, toilets for all, sanitation etc.
- Q12 Ensuring environmental sustainability
- Q13 Imparting employment enhancement vocational skills training and starting social business projects
- Q14 Contribution to Prime Minister's National Relief Fund or any other fund set up by the Central or State Govt. for socio-economic development and relief and funds for the welfare of the scheduled casts, the scheduled tribes, other backward classes, minorities and women
- Q15 The CSR activities are selected well-fitting to the need and executed with quality. I like it.

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