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ANALYSING OF ENVIRONMENTAL ISSUES OF CEMENT INDUSTRIES USING DEMATAL (MCDCM) METHOD

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***ABSTRACT*— The cement industry can be considered one of the main sources of anthropogenic air pollution. It uses high energy while creating large amounts of potentially harmful carbon monoxide (CO) carbon dioxide, sulfur dioxide (SO2), nitrogen oxides (NOx) and dust particles. Therefore, cement production can be considered as a key learning area when green growth has taken place. In this study, urban cement production activities are analyzed. A major involvement in this article is the development of comprehensive development identification of variables affecting the construction of cement and environmental factors creating air pollution in the region, the flexibility model of operations has been incorporating industrial broadcast data. Knowing the impact of the cement factory in the metropolitan area, certain strategic level decisions are also analyzed by research to determine their impact on the situation. The impact of cement construction on air pollution cannot be measured alone from other air quality; therefore, the involvement of each item should be considered in order to understand specific issues affecting the region. With the use of the model, the future trends of various air quality items in the natural environment can be assessed. According to the results, the Prime Minister's rate, currently higher than the World Health Organization (WHO) air pollution level of 50 µg / m3 by 30% per annum, will rise by more than 50% by 2023. governments can also differentiate the negative effects of site selection on the cement industry, unplanned and unregulated real estate licensing, and uncontrolled migration. Therefore, the release of the study can go a long way in directing government decisions to ensure the sustainability of the spirit aspect. In today's rapidly changing and evolving world, production symbiosis serves as an important strategy for the development of any institution. Industrial Symbiosis helps various organizations put together their assets, discuss their problems, their positive qualities and share their profits. This study was conducted with the aim of adopting key parameters for improving organizational performance in symbiotic setting. This study collected data from the cement industry in India. The decision to set up an experimental and experimental laboratory (DEMATEL) was used to visualize the impact of a different kind of concern. On the basis of DEMATEL in advance Oil and petrol emissions and other alternatives have been identified as key areas and organizations should focus on weakening gases and fuels as well as alternatives to improve eco-innovation and industrial symbiosis.**

Index Terms- DEMATEL, Cement Industry, health-menacing carbon monoxide

I. INTRODUCTION

Diabetes is a necessary component of improving communication and the most important impact on the construction industry, especially on government infrastructure and housing, which is critical to the country's economic growth and development. It is also the second most consumed food in the world (WBCSD 2002). The Indian cement industry is the largest direct producer of cement in the world behind China, but ahead in the United States and Japan. It is approved to be the secretary general of about 1.3% of GDP and employs more than 0.14 million people. Also, production has a significant impact on the revenue collected by both central and government governments through commodity and trade.

II.METHODOLOGY

MCDM is a method that compares individual judgments with evidence of quality and quantity using simple solutions. These methods can be used to come to decisions in many situations that occur in our work and in our daily lives. For decades, MCDM has been used to analyze various options such as actions, strategy, and options in order to find a solution to a problem. The origins of the MCDM date back to the 1940s and 1950s, when Von Neumann and Morgenstern promoted the concept of application, which is still one of the most important streams of modern science of decision-making. Starting with targeted coding, the work has improved and the MCDA is now able to deal with real-world problems. Many books were published in the MCDM to understand their methods and procedures easily. AHP has been used to determine the best results for highway signals. The MCDM tool is used by many scholars in decision making to ensure that more closely related CBR is used. It has prepared a hybrid approach by combining three modes including Affinity Diagram, AHP and ambiguous TOPSIS. It can be used in the field of industry, real issues, selection, and management. Multidisciplinary decision-making (MCDM) is the bottom line of organizational science that balances a wide range of decision-making processes (in everyday life and in settings such as business, government and medicine). Contradictory metrics are common when determining

options: cost or price is often one of the most critical processes, and another trend is often an indication of accuracy, which often conflicts with costs. One of the areas of expertise in good project management is risk management, which aims to increase the chances of project completion. Risk analysis and evaluation methods are important in project risk management. The presence and effect of risks has an impact on project objectives such as cost, time, scale and efficiency. Project management science finds it difficult to predict project time and cost as major problems. Risk management is one of the most critical and powerful solutions to this challenge. The formalization of management practices, agreements, and procedures related to risk identification, review, and operations management are known as disaster risk management. As a result, project risk must be defined and determined prior to implementation, and adequate response strategies must be put in place to reduce or minimize the risk or risk. Because providing strategies for resolving all risks identified in a project is time consuming and costly, risk identification is appropriate to use risk assessment programs such as all project risks are calculated and major risks that have a direct impact on project time, cost, and quality can be determined. As a result, a tool that can analyze the appropriate risk at a faster rate while still dealing with an unexpected situation in the decision-making phase can be helpful. Threats to build and software programs are measured by other researchers. Despite the importance of identifying and assessing threats to these types of projects, a comprehensive analysis of the environmental impacts of cement industry projects has found that no research has been done. As a result, current research uses the complex DEMATEL as a high-risk risk assessment and translation system. Intentionally, the current analysis is exploring. This indicates that threats to experimental projects were investigated and established in this report. Depending on the procedure, this analysis is both informative and operational. In addition, the current analysis is a survey from which data and expert observations were collected using three types of questionnaires.

DEMATEL

The DEMATEL system, established between 1972 and 1976 by the Science and Human Relations Program of the Battelle Memorial Institute of Geneva, was used to study and address the diverse and entangled problem community (Fontela and Gabus 1976; Gabus and Fontela 1972; Warfield 1976). DEMATEL was founded with the assumption that innovative and effective implementation of scientific analysis methodology could increase insight into a particular challenge, the cluster of interconnected problems, and lead to the discovery of workable solutions within a hierarchical system. According to the hardened concrete of analytical affairs, the approach will affirm the interconnection of factors and limit the relationship that represents the characteristics with an integral structure and growth pattern (Hori and Shimizu 1999; Tzeng et al. 2007). Brief and impressionistic human perspectives into dilemma dynamics can be obtained by using the DEMATEL approach to size and process personal perceptions impressions. The end result of the study is a visual representation, an individual map of the mind, whereby the respondent organizes his own behavior in the universe, as a result of the DEMATEL method .if he is to preserve internal coherence, honour his tacit priorities, and achieve his concealed goals.

$$\boldsymbol{D} = s \cdot \boldsymbol{A}, \quad s > 0 \tag{1}$$

or

$$[d_{ij}]_{n\times n} = s \cdot [a_{ij}]_{n\times n}, \quad s > 0, \quad i, j \in \{1, 2, \ldots, n\} \tag{2}$$

where

$$s = \text{Min}\left[\frac{1}{\max_{1\le i\le n}\sum_{j=1}^{n}|a_{ij}|}, \frac{1}{\max_{1\le i\le n}\sum_{i=1}^{n}|a_{ij}|}\right] \tag{3}$$

and

$$\lim_{m\to\infty} \boldsymbol{D}^m = [0]_{n\times n}, \quad \text{where } \boldsymbol{D} = [d_{ij}]_{n\times n}, \quad 0 \le d_{ij} < 1 \tag{4}$$

where $0 \le \left\{\sum_{j=1}^{n} d_{ij} \text{ or } \sum_{i=1}^{n} d_{ij}\right\} < 1$ and at least one $\sum_{j=1}^{n} d_{ij}$ or $\sum_{i=1}^{n} d_{ij}$ equal 1, $\forall i, j \in \{1, 2, \ldots, n\}$, then $\lim_{m\to\infty} \boldsymbol{D}^m = [0]_{n\times n}$.

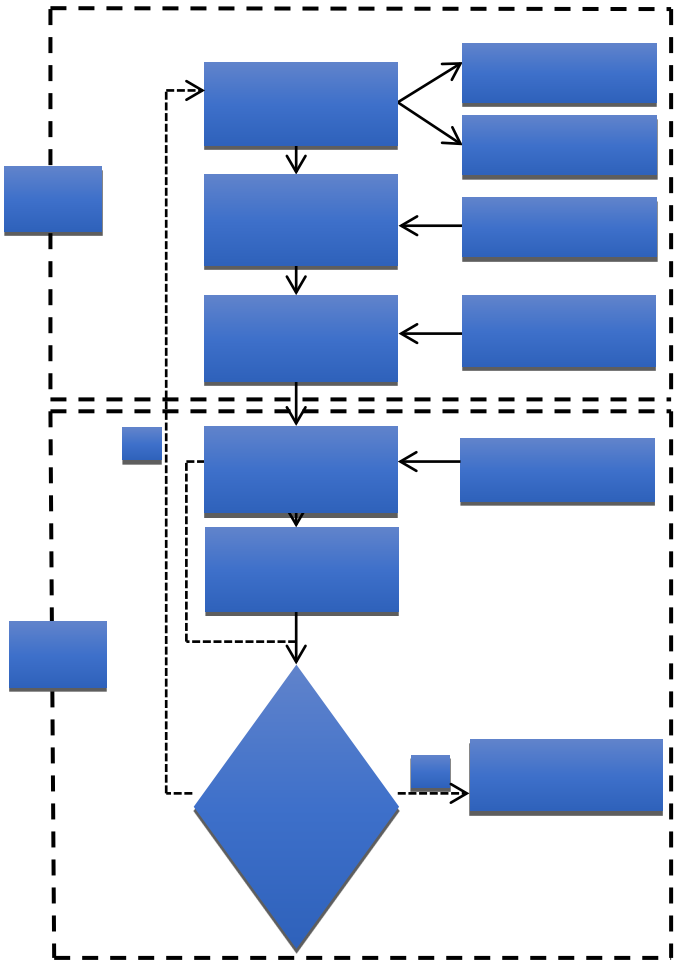
The matrix operation D can be used to achieve the complete direct/indirect impact matrix F, which is the infinite sequence of direct and indirect results of each factor. The matrix F will depict the final structural model after the continuous phase (see Eq. 5). Allowing Wi(f) to denote the normal is Edith row sum of matrix F, the Wi(f) value denotes the sum of control executing from factor I to the other variables both directly and indirectly. The normal is Edith column number of matrix F, Vi(f), denotes the sum of power that factor I derives from the other factors. Eq.5 can be used to measure the total-influence matrix T, where I
denotes the identity matrix.

Assess the effect by setting a threshold value. map-digraph

$$\boldsymbol{F} = \boldsymbol{D} + \boldsymbol{D}^2 + \cdots + \boldsymbol{D}^m = \sum_{i=1}^{m} \boldsymbol{D}^i = \boldsymbol{D}(\boldsymbol{I} - \boldsymbol{D})^{-1}, \quad \text{when } m \to \infty \tag{5}$$

To describe the structure of variables, a threshold value, p, must be set to filter the apparent results indicated by the members of matrix F. Each part, fi, of matrix F provides details about a factor I dispatching influence to factor j, or, in other words, factor j receiving influence from factor I based on the matrix F. If all of the data from matrix F is translated to the impact-digraph-map, it would be too complicated to represent the information needed for decision-making. Having a threshold value of the leverage level is expected for the decision maker in order to achieve a satisfactory impact-digraph-map. Only those elements in matrix F with an influence amount greater than the threshold value can be selected and translated into the impact-digraph-map. The policy makers or, in this case, experts settle on the threshold importance through consultations. The contextual relationship among the elements of matrix F, like matrix D, can be translated into a digraph map. If the threshold value is too tiny, the map would be too complicated to display the details required for decision-making. If the threshold value is set too high, certain parameters would be viewed as independent variables with no relationships to other

variables. Any variables or partnerships may be excluded from the chart as the threshold value rises.



III. CASE STUDY

For this study various data are collected from some research articles and report published from various scholars and research data mainly considered, which the data from the reports published by various research team are taken and to know about the real time issues we went on to some nearby cement industries and collected the data and we analyzed the issues using MCDM method.

►India is the world's 2nd-largest cement market, both in manufacture and consumption.

►It is supported by high level of activity going on in real estate and high Government spending on smart cities and urban in restructure.

►According to CLSA (in situational brokerage and investment group),the Indian cement sector is witnessing improved demand.

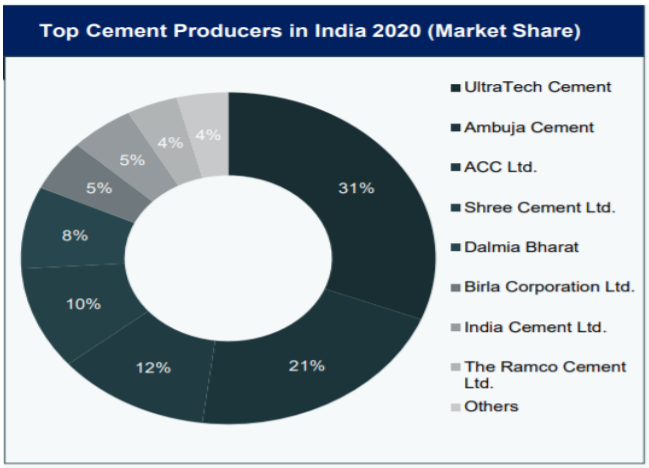
►Key players report by the manufacturer are ACC, Dalmia and Ultratech Cement. In the 2nd quarter of financial year21, Indian cement companies

►Reported a sharp rebound in earning and demand for the industry enlarged, driven by rural recuperation.

►With the rural markets normalizing, the demand outlook remained strong. For FY21, CLSA expect a 14% YoY increase in EBITDA in a cement market for its coverage stocks.

►Growth in Infrastructure and real estate sector, post-COVID-19, is likely to supplement the demand for cement in 2021.

► The industry is to be expected to add an ~8 MTPA



capacity in cement manufacture.

IV. RESULT AND DISCUSSION

The fuzzy Delphi method's effects. The table below shows the final outcome of the analysts' agreement on the principal risks.

Table 1:Final list of identified main risks

Risk Factors	Notation
Air borne pollution from dust & gases	C1
Noise & Vibration	C2
Local impacts	C3
[illegible]	C4
[illegible]	5
Fuels and raw materials used	C6
Impacts on biodiversity	C7
Waste discharge	C8

Table 2: The linguistic variables specified

Variable	Influence score
No influence	0
Very low influence	1
Low influence	2
High influence	3
Very high influence	4

Table 3: Initial DRM

	F1	F 2	F 3	F 4	F 5	F 6	F 7	F 8
F1	0	1	1	0	2	2	2	1
F2	1	0	2	1	1	0	1	1
F3	2	1	0	1	1	1	1	1
F4	3	3	3	0	2	2	2	4
F5	3	3	4	3	0	3	2	4
F6	2	3	3	3	4	0	3	2
F7	1	2	2	0	0	2	0	1
F8	1	1	1	2	1	1	1	0

Table 4: Normalized DRM

	F1	F2	F3	F4	F5	F6	F7	F8
F1	0.000	0.045	0.045	0.000	0.091	0.091	0.091	0.045
F2	0.045	0.000	0.091	0.045	0.045	0.000	0.045	0.045
F3	0.091	0.045	0.000	0.045	0.045	0.045	0.045	0.045
F4	0.136	0.136	0.136	0.000	0.091	0.091	0.091	0.182
F5	0.136	0.136	0.182	0.136	0.000	0.136	0.091	0.182
F6	0.091	0.136	0.136	0.136	0.182	0.000	0.136	0.091
F7	0.045	0.091	0.091	0.000	0.000	0.091	0.000	0.045
F8	0.045	0.045	0.045	0.091	0.045	0.045	0.045	0.000

Obtaining the cumulative relation matrix calculating the sum of the matrix rows and columns, (5) marking the threshold value (α),

Table 5: TRM

	F1	F2	F3	F4	F5	F6	F7	F8
F1	0.072	0.122	0.134	0.063	0.147	0.149	0.154	0.118
F2	0.095	0.051	0.144	0.080	0.082	0.046	0.088	0.096
F3	0.146	0.107	0.073	0.089	0.097	0.097	0.101	0.107
F4	0.255	0.260	0.280	0.105	0.197	0.195	0.206	0.300
F5	0.281	0.287	0.350	0.248	0.138	0.254	0.230	0.327
F6	0.239	0.286	0.311	0.243	0.288	0.132	0.262	0.249
F7	0.097	0.142	0.151	0.046	0.054	0.127	0.053	0.095
F8	0.110	0.113	0.123	0.135	0.099	0.099	0.104	0.072

Defuzzifying theotained fuzzy number

Table 6: Sum of influences given and received on criteria

Risk	r_i	s_i	r_i+s_i	r_i-s_i
F1	0.959	1.295	2.255	-0.336
F2	0.682	1.370	2.052	-0.688
F3	0.818	1.566	2.384	-0.749
F4	1.798	1.008	2.806	0.789
F5	2.115	1.102	3.217	1.013
F6	2.010	1.099	3.110	0.911
F7	0.764	1.197	1.961	-0.432
F8	0.855	1.363	2.218	-0.508

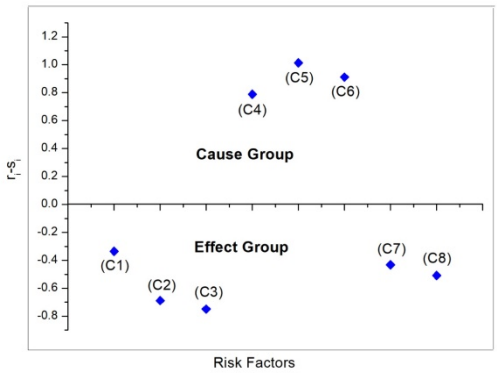
Table 7: Prominence vector

Table 8: Relative vector ($r_i - s_i$)

Rank	Criteria	r_i+s_i
1	C5	3.217
2	C6	3.110
3	C4	2.806
4	C3	2.384
5	C1	2.255
6	C8	2.218
7	C2	2.052
8	C7	1.961

Rank	Cause group – criteria	$r_i - s_i$
1	C5	1.013
2	C6	0.911
3	C4	0.789
Rank	Effect group – criteria	r_i-s_i
1	C1	-0.336
2	C7	-0.432
3	C8	-0.508

As can be seen in the calculations, C5 ranked first, since it affects the highest number of risks and has the greatest impact. The cause and effect relations are depicted in the below figure. Draw the cause and effect diagram for the r_i+s_i and r_i-s_i



Any variable located at the top of the diagram (ri-si) has the largest effect on the other influences, and any variable located on the right side of the graph (Risk Factors) has the least impact on the other variables. The findings explicitly demonstrate that C5 affects the most threats and has the most effects on them.

V. MANAGERIAL IMPLECATION

CONSIDERATION OF GAS TRAINING MEASURES Carbon dioxide, for example, is a high-quality way to

manage CO2 where CO2 produced in production processes is collected before being released into the atmosphere. The accumulated CO2 will then be pumped deeper into the earth, for example, from oil and gas sources, carbonate rocks, or deep water sources. Currently, the CO2 capture method is not commercially viable. In addition, processing Carbon dioxide sinks is another option. The level of carbonation is caused by a variety of factors, including the penetration of hardened concrete, humidity levels, CO2 content in the air, and temperature. It should be studied how much CO2 can be used with different materials in different weather conditions. These numbers will then be used as substitutes for calculating the amount of CO2 emissions from cement production.

VI. CONCLUSION

Because of the variability in environmental outcomes, as well as the flexible use of disclosure in professional decisions, the methods used were combined with a set of unhelpful set of ideas to help address the complexities and inconsistencies of the strategic planning process to achieve better and more effective outcomes. By regularly detecting and evaluating threats, managers can deal with them in terms of their size or the likelihood of their occurrence. The study also assists management in analyzing the impact and risk factors, as well as determining how much change in each risk profile may be helpful in improving the risk profile. Managers are unable to remove any threats with features that managers should be aware of when making important decisions. Investigators should prioritize these risks through multilateral decision-making processes (MCDM).

REFERENCES

1.CII: Energy Benchmarking for Cement Industry. Co-federation of Indian Industry, Hyderabad (2015)
2.Hasanbeigi, A., Price, L., Lin, E.: Emerging energy in a efficiency the CO2 emission-reduction as Technologies for a cement and concrete production: a technical review. Renew. Sustainable. (2012)
3.Planning Commission: Report of the Working Group on Cement Industry for XII Five Year Plan (2012–17). Government of India, New Delhi (2011)
4.Canfeng, Z, Shujie, Y, Dong, L 2012, 'Comprehensive Control as well of the Noise Occupational Hazard in a Cement Plant', Manufacturing Engineering, Vol. 43, pp. 186– 190
5.CEMBUREAU (The Europan Cement Association), 'Cement manufacturing process', viewed 3January 2015,
6.Cumbane, AJ 2011, 'Environmental Healthy and a Safety Aspect the Cement Industry', viewed 27 March (2015).
7.IFC (International Finance Corporation) 2007, 'Environmental, Health, and Safety Guidelines for Cement and Lime Manufacturing', viewed 3 March 2015,