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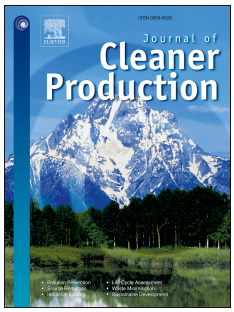

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What Determines Environmental Proactiveness in the Indian Cement Sector? An Empirical Study

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What determines environmental proactiveness in the Indian cement sector? An empirical study

Abstract

The lack of clarity in the environmental strategies has created uncertainty towards industrial efforts to protect the environment. However, some firms are more apprehensive regarding environmental protection in comparison to their counterparts. What determines the environmental proactiveness of these firms which go beyond extant laws to adopt proactive environmental strategies (PES)? This article, through an empirical study of the Indian cement sector, identifies the determinants of adoption of PES. Quantitative analysis of survey data from 310 respondents identifies four determinants; organisational capability, market benefits, stakeholder pressure, and environmental risk management. Four hypotheses are proposed to test the Confirmatory Factor Analysis (CFA) outcome. Organisational capability and market benefits are observed to be the key determinants. The study determines the strength of the identified determinants on PES adoption using structural equation modelling (SEM) and path analysis. Path analysis ranks the determinants in the order; organisational capability, market benefits, environmental risk management and stakeholder pressure. The evidence based findings from the research are expected to be useful for the environmental management practitioners as well as academicians. On the global front, the developing countries having identical socio-economic and political structure may gain from the findings of the study.

Keywords: Proactive environmental strategies; organisational capability; market benefits; factor analysis; structural equation modelling; cement sector.

1 Introduction

Emission intensive cement sector, a critical sector forming the core of a nation's infrastructure development has raised environmentalists' concern towards environmental damage. Normally environmental compliance is observed to safeguard firms' business interests. However, some companies go beyond the regulatory requirements to prevent and minimise the environmental damaged caused due to their operations. What determines the adoption of PES which are beyond regulatory compliance? Now a days, manufacturing processes are much cleaner and energy efficient due to new technologies and sustainability initiatives. As per the World Business Council for Sustainable Development, "concrete is the

most widely used material on earth after water". Cement contributes around 10 to 11 per cent of the concrete mixture. One ton of cement production releases approximate a similar quantity of CO_2 into the atmosphere. Globally, of the total anthropogenic CO_2 emissions, cement industries contribute approximately five to six per cent. Technology improvement is considered to be a critical factor by policymakers, technologists, and industries for a lasting and worthwhile solution to the environmental complications caused by industrial operations (Shrivastava, 1995). Adoption of cleaner technology is not as per expectations in spite of numerous benefits, both operational and strategic, to the adopters (Howes et al., 1996). World Commission on Environment and Development (WCED, 1987) drew serious attention towards environmental issues decades ago. An increasing number of companies are determined to follow a strategic view towards sustainable development by adopting PES for achieving environmental goals through the established procedures and organisational routines. Cooperative carbon emission reduction strategy is observed to be advantageous as compared to stand alone approach. (Wang et al., 2018).

The PES are considered to be more stringent than required by the law. PES comprises in-house efforts at instituting environmental strategies and targets, training employees, establishing environmental benchmarks for suppliers and competitors, responsible environmental auditing and transparency in environmental reporting. Savino and Shafiq (2018) in a study of Asian firms investigated the key sustainability drivers responsible for the improvement in production performances. Hart (1997) mentioned a potent statement regarding sustainable development proposed by environmentalists Paul Ehrlich and Barry Commoner five decades ago. According to the study, three factors, "population (P), affluence (A), and technology (T)" determine the total environmental burden (EB), which states EB = P * A * T. Barring population and affluence as social issues, technology remains the only alternative to attain sustainability. Angell and Klassen (1999) observed evidence of understanding for environmental issues and improving practices in manufacturing strategy, supply chain management, and technology management. Hart (1997) proposed a sustainability portfolio which specifies "pollution prevention, product stewardship and cleaner production" as key drivers of sustainability. Cieges et al. (2015) identified the reassurance of PES and the need for new technologies as crucial challenges towards sustainability. Several studies identify specific factors which are external to the firm like regulation and competition as drivers of PES (Aragón-Correa, 1998; Delmas, 2003). Individuals' proactive ecological conduct and the explanation behind such conduct has turned

into a rising interest (Fielding and Hornsey, 2016). Prakash (2001) mentioned PES as "strategies which are beyond compliance but are different from over-compliance". Firms follow monitoring of regulations in over-compliance, nevertheless due to technological indivisibilities deliver more than the statutory obligation. Beyond-compliance strategies deliver more than as required by law. The contribution of characteristics of the firms is viewed by researchers in describing 'beyond compliance' adoption which comprises the impact of organisational framework and design (Sharma, 2000) and organisational learning (Marcus and Nichols, 1999). Savino and Batbaatar (2015) provided indicators for firms which created a strategic asset of Integrated Management Systems and investigated variance of core resources pattern contained in the perspective of characteristics of a firm. A stream of research articles focussed towards the specific or managerial level while studying the contribution of managerial attitudes (Sharma, 2000) and leadership ethics (Egri and Herman, 2000). Strict environmental regulations may lead to better environmental performance. However, non-implementations of regulations may lead to a violation of norms. Wang and Wang (2018) observed a significant effect of corruption leading to reduced environmental performance. Klassen and Mclaughlin (1996) proposed linking of robust environmental management to impending financial performance through a hypothesised model. Firms usually have a couple of alternatives for voluntary environmental action: employing specific practices like internal audits or environmental cost accounting apart from adoption of official intended plans like environmental management system (EMS) and green building certification. Adopting EMS ISO 14001 can lead to the legitimisation of business in terms of environmental protection (Vykoukal, 2011). Link and Naveh (2006) observed that firms could improve their business performance by adopting environmental management standard ISO 14001 as it helps in reducing adverse environmental impact due to their business activities. Savino and Apolloni (2007) explored the expected impacts of ISO 14000 implementation and their implications on Small or Medium Sized Enterprise (SMEs). Wu et al. (2008) from the resource based view perspective examined the essential assets responsible for making EMS a crucial factor for a sustainable competitive advantage for the firm.

Savino and Mazza (2014) created a systematic methodology for integrated improvement in quality and environmental audits by prioritising remedial actions. Curkovic et al. (2000) statistically and empirically evaluated the relation between Total Quality Management (TQM) and Environmentally Responsive Manufacturing (ERM). Table 1 represents the

comparative studies on determinants of universal environmental management practices and the methods adopted.

----- Insert Table 1 Here -----

The research identifies organisational capability, market benefits, environmental risk management, and stakeholder pressure as the determinants of adoption of PES. Path analysis ranks organisational capability and market benefits above environmental risk management and stakeholder pressure. The research paper is organised as: Section 2 describes the proposed theoretical framework and hypotheses development followed by methodology in Section 3. Section 4 deliberates the results. Section 5 covers managerial implications, contribution, limitations, and directions for future research.

2 Theoretical framework and research hypotheses

A questionnaire is prepared (please see supplementary information) comprising of 49 questions based on environmental reports and literature review followed by experts' opinion. The questionnaire is divided into following different categories based on the survey question's nomenclature:

Environmental Vanguard Oriented (EVO)

Industry Dynamics (ID)

Business and Profitability Oriented (BPO)

Natural Resource Conservation and Emission Reduction (NRCER)

Cleaner Technology Oriented (CT)

Sustainability Vision Oriented (SV)

Category EVO includes variables connected with forerunners representing the initiators on the environmental front. Questions in the ID group comprises industry dynamics. BPO category includes questions about business and profitability dimension. Items which reflect the efficient use of resources and emissions reduction are placed in NRCER category. Finally, CT and SV categories include items describing cleaner technology and sustainability vision.

2.1 Research questions

Firms are informed in perceiving their obligation towards the preservation of the environment following the antagonistic impact of the industrial production processes and products. However, few firms go beyond regulatory requirements to implement environmental protection strategies. Are there any specific determinants which drive these firms for being proactive towards environmental protection? Can the results of other similar studies be generalised worldwide?

Based on the literature mentioned in the previous section, the study aims to answer the following research questions:

What are the determinants which are responsible for the adoption of PES in India's cement sector?

What is the strength of the determinants identified on the PES adoption in India's cement sector?

2.2 Hypotheses development

Organisational capability

Organisational capability is the ability of the firm to manage its resources to gain competitive advantage. Strategic planning and competitive advantage literature explore financial, strategic and technological capabilities as three traditional means of gaining a competitive advantage. Better services, competitive pricing and innovative technological incorporation into research and manufacturing operations essentially be supplemented by organisational capability (Ulrich and Lake, 1991). Danish et al. (2018) suggest higher investment by the government in research and development to improve technological strength and intellectual property rights management creating a favourable atmosphere for environmental protection. Sharma (2000) studied the influence of organisational capability on PES adoption. Firms adopting PES gain a competitive advantage by generating valuable organisational capabilities (Hart, 1995). Several researchers studied the influence of specific organisational factors on the readiness to adopt PES. Examples of such internal organisational factors include managerial interpretation of issues related to the environment (Sharma, 2000); employees concern towards environmental protection (Cordano and Frieze, 2000) and proactive corporate policy (Andersson and Bateman, 2000). Sharma and Vredenburg (1998), identified that "strategies of proactive responsiveness to the uncertainties inherent at the interface between the business

and ecological issues were associated with the emergence of unique organisational capabilities, and had implications for firm competitiveness".

Considering the above literature review following hypothesis is proposed:

Hypothesis 1: Organisational capability is the key determinant for the adoption of PES.

Market benefits

Even though several studies identify economic opportunity as a driver of PES (Bansal & Roth, 2000), however, the role of environmental strategy and practice for economic benefit is yet to be determined. Porter and Van der Linde (1995A) stated, theoretically, firms can gain market benefits by adopting PES as they reduce their emissions with the corresponding reduction in input costs, through cost saving and liability reduction, improved efficiency, and use of alternative fuels and expertise available for environmental protection. Porter and Van Der Linde (1995B) mentioned the role of market benefits for driving corporate environmental responsiveness. They argued that pollution is the result of underutilised resources and a firm can gain a competitive advantage if it has a suitably designed environmental strategy. Study of customer interest in green products shows customers' interest in knowing the environmental impact of the manufacturing process of the products they buy. The study identified that the majority of US customers bought products with low carbon footprints, while most of them adopted environmentally friendly practices like recycling (Grail, 2009). Walley and Whitehead (1994) advocated market benefits through investment in environmental practices having a payback in defined economic timeframe through prior assessment of future environmental regulations resulting in reduced cost of regulatory compliance, cost saving through reduced waste disposal, improved efficiency due to reduced energy use, etc. Firms gain market benefits by adopting strict environmental regulations as it provides them with a competitive advantage in new markets where there is demand for low carbon footprint products (Porter and Van der Linde, 1995A; Porter, 1991).

Based on the literature review and conclusions mentioned above, the following hypothesis is proposed:

Hypothesis 2: Market benefits is the key determinant for the adoption of PES.

Environmental risk management

Firms' environmental performance makes a positive impact on the value chain stakeholders. Firms ensure better environmental risk management for acceptance of their product in the

market along with a better relationship with regulatory authority and support of the local community. Poor environmental risk management may lead to public boycott resulting in market rejection of the product and high environmental restoration cost as a result of legal action by the local community and societal stakeholders (Henriques and Sadorsky, 1996). Violation of environmental compliance may risk penalties and business interruptions (Henriques and Sadorsky, 1996). Nakamura et al. (2001) studied PES adoption by foreign companies for ensuring a better relationship with the local regulatory authorities to ensure the legitimacy of their business. Banerjee et al. (2003) identified regulatory pressure and the local community's concern towards environmental destruction as key determinants of PES. Regulatory compliance due to its coercive action influences a firm in adopting environmentally friendly policies (Delmas, 2003).

The effectiveness of environmental risk management depends on existing corporate environmental practices dealing with environmental risks and their ability to benefit from recently generated opportunities. Studies based on environmental risk management highlighted the influence of corporate environmental practices on the firms' environmental performance while emphasising the effective corporate environmental practices for the economic and environmental performance improvement (Albertini, 2013; Porter and Van der Linde, 1995A).

Based on the above research and conclusions, the following hypothesis is proposed:

Hypothesis 3: Environmental risk management is the key determinant for the adoption of PES.

Stakeholder pressure

Literature based on green business distinguishes between compliance-driven firms aiming to meet only the regulatory requirement and firms who are proactive in adopting environmental strategies by considering the factors apart from regulatory compliance (Schot and Fischer, 1993). Buysse and Verbeke (2003) empirically assessed the affiliation between the importance of stakeholders and the level of environmental proactiveness using survey data from Belgian firms. According to stakeholder theory, a firm can improve its financial performance if its managers manage various stakeholders in a better manner (Donaldson and Preston, 1995). The enhanced environmental performance due to stakeholder pressure can improve efficiency and legitimacy leading to an advantage over competitors and profits (Hart, 1995, 2005). Employees' training has a mediating effect on the PES adoption

motivated by stakeholder pressure (Sarkis et al., 2010). A constructive association between PES adoption and stakeholder pressure is confirmed through stakeholder theory and empirical evidence. Nevertheless, the circumstances and the role of particular stakeholders on PES adoption is somewhat underexplored.

According to the views of the above authors, there appears a positive association between PES adoption and stakeholder pressure. Thus, the following hypothesis is proposed:

Hypothesis 4: Stakeholder pressure is the key determinant for the adoption of PES.

Fig. 1 represents the hypothesised model.

----- Insert Fig. 1 Here -----

2.3 Significance of research and objectives

The study primarily intends to deliver empirical evidence-based knowledge relating to determinants of PES adoption in the Indian cement sector. These determinants additionally contribute to the choice of strategies for environmental protection. Providing insight for the environmental managers, policymakers and decision makers responsible for environmental protection in the formulation of policies based on the outcome of the study is another contribution. The effort ensures that the study considers the variables which are not within the sphere of regulatory compliance for a thorough understanding of the determinants responsible for motivating proactive environmental behaviour. The study offers inferences to decision makers specifically policymakers and environmental managers intending for improvement in environmental performance, organisational capability, stakeholder satisfaction, operational efficiency, and market benefits for the cement sector companies. The identified determinants and the variables within may provide a basis for framing policy guidelines for environmental protection so that evidence-based practices can be effectively employed.

3 Methodology

3.1 Instruments involved in the collection of data

Survey research has been acknowledged as being scientific and accurate for the past few decades when compared to other methodologies (Zikmund, et al., 2012). One of the significant advantages of the survey method is that it helps in data collection from every

member of the population under study if the total population is small (Hussey and Hussey, 1997). Information sources which are primary like focus group dialogue, survey techniques, extensive interviews, and experts' opinion helped in identifying various variables under different dimensions. Sustainability and environmental reports of the cement sector companies provided for secondary sources of information. The study uses both primary as well as secondary sources of information. The duration of the interviews was 45-60 minutes. Two focus group discussions helped in building recognition of determinants of PES for the decision makers in the cement sector. The degree of resemblance, overlap or misperception were eliminated using content analysis. A pilot study was conducted for validating the cost, time, feasibility, contrary events, and effective size (statistical variability). The pilot study helped in design improvement and prediction of a suitable sample size before a full-scale research project involving consultation with experts in identifying variables related to different categories. The study adopts the non-probabilistic sampling theory for selecting respondents based on their acquaintance and awareness regarding the PES. Combining methods like purposive sampling and snowball sampling helped in the selection of respondents. Cement sector firms following the Global Reporting Initiative (GRI) norms or similar guidelines and reporting sustainability issues regularly were the target respondents. The identified respondents were aware of sustainability reporting, stakeholder engagement, environmental management practices, and along with a prior understanding of the adoption of PES. Pilot study and initial EFA involved 115 responses. 195 more responses were collected for the 6-factor 49-item scale validation for the final analysis. A total sample size of 310 responses was involved in the final study involving EFA and CFA. The data collection was carried out from May-2015 to July-2016. Classification of respondents based on the management level is shown in Table 2 whereas Table 3 reflects department wise classification.

----- Insert Table 2 Here -----

----- Insert Table 3 Here -----

3.2 Questionnaire design

The questionnaire is designed to ensure maximum clarity regarding significant drivers responsible for the PES adoption. Two focus group studies helped in understanding the key

dimensions of PES adoption. Earlier related studies and the information collected through available literature and the focus group studies facilitated in designing of the final questionnaire (Hart, 1995; Sharma and Vredenburg, 1998; Prakash, 2001). Multiple articles' review helped in identification of various variables linked with the adoption of PES. The detailed survey questionnaire is included in Appendix Table A.1. Experts from the field validated the questionnaire. The categorisation of the questionnaire items into various categories is shown in Appendix Table A.2. Seven point Likert scale is considered for the study. The scale measures the response as 1=strongly disagree to 7=strongly agree for subjective assessment related to measurements in the study.

3.3 Analysis of data

The study uses Statistical Package for Social Sciences (SPSS) version 23 for quantitative analysis of data. Two parameters, Reliability and Validity, check the appropriateness of the measures used for measuring concept. The reliability measure indicates that a particular measure measures a particular concept consistently across time and geographical boundaries. This consistency of measure is determined by calculating the inter-correlation between the variables, considered for measuring the concept. Cronbach's α is a coefficient that indicates inter-correlation among the items. In other words, it determines the extent of measures in capturing a particular concept. Cronbach's α determines the statistical significance of survey measures having a range from 0 to 1. The measure is considered statistically significant if the Cronbach's α value is closer to 1, meaning that items which measure a particular concept are highly correlated with each other. For the current analysis, Cronbach's α value is 0.916, which indicates the validity and reliability of the data. According to George and Mallery (2003), "a value of 0.7 and above of Cronbach's α shows that dimensions considered are reliable". Table 4 represents the outcome of reliability analysis.

----- Insert Table 4 Here -----

According to Yong and Pearce (2013), Kaiser-Meyer-Olekin (KMO) Test determines the data suitability in terms of sampling adequacy with KMO value > 0.5 considered as acceptable. The significance value for Bartlett's test should be below 0.05, which shows that samples are

from a population with equal variances. KMO value of 0.956 and 0.000 as significance value, represents appropriateness of data for factor analysis as shown in Table 5.

----- Insert Table 5 Here -----

Factors are extracted using Principal Component Analysis (PCA) using Varimax Rotation. "A minimum cut-off criterion for the deletion of the items is factor loadings (>0.50), cross-loadings (<0.40) or commonalities (<0.30)" (Hair et al., 2010). Latent variables identified by factor analysis contribute to the common variance between a set of measured variables. The analysis considered the factors which have an eigenvalue > 1. Table 6 reflects the outcome of the PCA explaining 75% variance.

----- Insert Table 6 Here -----

The rotated component matrix depicts the relationship between factors and the individual variable as shown in Table 7.

----- Insert Table 7 Here -----

After EFA, Analysis of Moment Structures (AMOS) is used for CFA to further analyse the data followed by the model fit analysis. "AMOS is utilised to specify, estimate, evaluate, and present the model in an intuitive path diagram representing hypothesised relationships among variables" (Arbuckle 2005). Six variables were eliminated during the model fit. Hair et al. (2010) advocate the use of SEM for testing proposed model hypotheses with the help of the maximum likelihood method. Accordingly, the study uses SEM to test the hypotheses. SEM validates proposed model's goodness of fit. Loading estimates confirm the stability of variables measured (Hair et al., 2010). Parameters stability representing measurement model's validity is reflected by uniformity in the factor loadings. For the overall model fit, 'p' value is checked using chi-square statistics estimates. The dependent variable is represented by PES, which includes cleaner technology adoption and sustainability vision.

4 Results

The following sections discuss the results of CFA and SEM.

4.1 Confirmatory Factor Analysis (CFA)

Suitability of survey data collected for the study is validated for consistency and reliability by the goodness of fit index. CFA required the deletion of six items for arriving at model fit. Fig. 2 represents the results of CFA.

----- Insert Fig. 2 Here -----

4.2 Model fit summary

"Cmin/df is the ratio of minimum discrepancy to its degrees of freedom. Cmin/df to degrees of freedom ratios in the range of 2 to 3 indicate an acceptable fit between the hypothetical model and the sample data" (Carmines and McIver, 1981, p. 80). For the current study, the value of Cmin/df is 2.695 which is acceptable. Model adequacy measure is represented by the population discrepancy function (Steiger and Lind, 1980). The Comparative Fit Index (CFI) is an incremental fit index. It evaluates the superiority of the tested model over the alternative model with manifest covariance matrix (Chen, 2007). CFI value closer to 1 is considered ideal. The CFI value under the present study is 0.900 and is acceptable. RMSEA which is the population root mean square error of approximation represents the discrepancy function obtained by population moments model fit rather than sample moments. RMSEA value <0.08 indicate a reasonable error of approximation (Browne and Cudeck, 1993). RMSEA obtained for the study is 0.074 which is a reasonable error of approximation according to various studies. The incremental fit index is represented by the Tucker-Lewis Index (TLI). Value closer to 1 is considered ideal. For the present study, the value of TLI is 0.892.

The additional model fit parameters are also within the prescribed limits according to the available studies. Table 8 illustrates the summary of the model fit.

----- Insert Table 8 Here -----

4.3 Structural equation modelling (SEM)

After establishing the proposed measurement, the study tests the model hypotheses using Structural Equation Modelling (SEM) (Hair et al., 2010). The goodness of fit for a proposed model is checked by using SEM. The SEM is also used for testing the hypothesised paths between constructs. According to Hair et al., (2010), examining loading estimates confirm the stability of measured items. The parameters are considered stable when the loadings do not show any substantial change. This is also known as a measurement model validity. The present study checks the 'p' value by estimating the chi-square statistics for overall model fit. Organisational capability, market benefits, environmental risk management, and stakeholder pressure are considered as independent variables depending on the grouping of drivers by factor analysis. SEM model of the model is shown in Fig. 3.

----- Insert Fig. 3 Here -----

Appendix Table A.3 shows the classification of variables within the identified determinants.

The study analyses four hypotheses. According to the outcome, the analysis support hypotheses H_1 and H_2. The analysis does not support hypotheses H_3 and H_4. The standard error (S.E.) represents the standard deviation of the theoretical distribution, an indicator of the statistical accuracy of an estimate. The critical ratio (C.R.) represents the estimate to the standard error ratio. The value of C.R. > 1.96 reflects that a path is significant at the 0.05 level. The value of 'p' < 0.001 (marked ***) shows that for the determinant organisational capability, in absolute terms, there is a probability of getting C.R. as high as 9.402.

Further, the regression weight for the determinant organisational capability in predicting PES at 0.01 level is significantly different from zero. Interpretations for other determinants are made on similar lines. Results of hypotheses testing using SEM are depicted in Table 9.

----- Insert Table 9 Here -----

4.4 Path analysis

Developed by Sewall Wright, path analysis determines the fitness of a nonexperimental multivariate data set with a particular causal model. Exogenous variables considered for the study are organisational capability, market benefits, environmental risk management, and stakeholder pressure. The variance of these exogenous variables is assumed to be caused

entirely by variables, not in the causal model. These variables are connected with double ended arrows indicating the correlation among these variables will not be analysed as the variables are not to be identified as a cause of other variable. The scope of the study involves an understanding of the causal relationship between dependent and independent variables.

Organisational capability with a score of 0.69 is the strongest determinant; followed by market benefits having a score of 0.37. Environmental risk management and stakeholder pressure, are ranked lower at 0.04 and 0.02 respectively. SEM path analysis is depicted in Fig. 4.

----- Insert Fig. 4 Here -----

5. Conclusions

5.1 Discussion of results

Although determinants of PES adoption are widely discussed in prior researches, a specific study is yet to be reported for the Indian cement sector. To fill this research gap, this study statistically analysed the Indian cement sector and proposes organisational capability, market benefits, environmental risk management, and stakeholder pressure as the determinants of PES. Path analysis ranks the determinants in the order organisational capability, market benefits, environmental risk management, and stakeholder pressure. The drivers of 'organisational capability' include innovation, corporate policy, knowledge of future environmental liabilities, product and brand differentiation. Products with reduced carbon footprint can create opportunities in the new market and address the concerns of shareholders, the local community, and the judiciary. Better performance than competitors and encouragement due to customers' acceptance of a premium for a green product can compel the firms to incorporate the proactive environmental criteria in management decision making. Several researchers have identified organisational capability as a key determinant of adoption of PES (Hart, 1995; Ulrich and Lake, 1991). The next determinant in the order of ranking is 'market benefits'. After the removal of state monopoly in the cement sector, the sector has witnessed a dominance of major national and multinational firms. Apart from profit earning, companies can create a better reputation by addressing customer concern through prior preparedness for future environmental legislation. Such initiative helps in cost savings and liability reduction. A firm can develop expertise for market leadership through the efficient production process and judicious use of fossil fuels. A stream of researchers has advocated

that firms can gain market benefits through PES adoption (Porter and Van der Linder, 1995B). 'Environmental risk management' is the next determinant in the ranking. High cost involved in the restoration of the environmental damage caused by inefficient production process and the apprehension of the market rejection of products are some of the drivers of this determinant. Other drivers are better long-term financial performance, contractors' influence, and support of the local community. Better relationship with the regulatory authority can help in gaining competitive advantage leading to improved profits. Several studies observed the influence of environmental risk management in PES adoption (Delmas, 2003; Nakamura et al., 2001; Henriques and Sadorsky, 1996). Determinant next in line is 'stakeholder pressure'. Pressure from the regulatory authority, Non-Governmental Organisations (NGOs), and media can force the firms to adopt PES. Waste reduction, which can help in the reduction of expenditure incurred towards waste disposal and regulatory incentives leading to profitability, can help in gaining stakeholders' confidence. Hart (1995) mentioned that stakeholder pressure plays a prominent role in PES adoption.

Further, the study proposes four hypotheses. The hypotheses are tested using SEM. The analysis supports the hypotheses H_1 and H_2, stating 'organisational capability' and 'market benefits' as the key determinants of adoption of PES respectively. Hypotheses H_3 and H_4, specifying 'environmental risk management' and 'stakeholder pressure' as key determinants are not supported. After the withdrawal of government restrictions, the cement sector in India is dominated by private firms which have a share of 94 per cent in the total cement production. These firms have developed organisational capabilities which enables them in effective addressing of environmental issues. These firms follow the Global Reporting Initiative (GRI) guidelines and regularly publish annual environmental sustainability reports and follow environmental audits. As the primary aim of these firms is to earn profits, they cannot afford to lose the market benefits on account of poor environmental practices. A severe penalty on account of violation of environmental norms can affect their brand value and cause loss of reputation in the global market. The above reasons tend to justify the supporting of hypotheses H_1 and H_2. Regarding the rejection of hypotheses H_3 and H_4, the justification may be the fact that firms' characteristics play a decisive role in the selection of PES. Multinational cement companies have a legally responsive system in place to respond to any threats from a regulatory decision or stakeholder pressure. The defined management policy ensures that threats are addressed legally well before they pose a problem for the company. Due to the above reasons, cement sector companies may not have strong influence

of environmental risk management and stakeholder pressure on their proactive environmental behaviour. Thus, the analysis is correct in ranking these determinants lower in order than organisational capability and market benefits. There may be an opinion that results from other studies can be generalised for the geographical area. However, studies have identified different motivations for the adoption of PES for different industrial sectors in similar geographical area. In a study of the Indian power sector, the determinants identified were "institutional pressure, performance improvement business practices, and market pressure and benefits" (Vishwakarma et al., 2018). It can be concluded that two different sectors, i.e., power and cement, though in a same geographical area, and having their operations in similar socio-economic and political conditions can have different determinants of adoption of PES.

5.2 Managerial implications, contribution, limitations, and directions for future research

The study contributes to the PES perspective by finding empirical evidence for the determinants responsible for PES adoption in the Indian cement sector. The empirical study is expected to ensure an understanding of the circumstances which compel the firms to adopt PES. For the environmental managers, our results specify a focus on the determinants to complement their willingness in adopting PES. The environmental managers in the cement sector can greatly benefit from the outcome of the study as it can help them in deploying evidence-based practices in their fight towards environmental protection. As far as regulatory bodies are concerned, the authorities can make use of the results of the empirical analysis for creating policies related to environmental regulation which are effective and acceptable to the industries. From the theoretical aspect, the study offers and tests a conceptual model of determinants of PES in the Indian cement sector and is expected to contribute to environmental protection and sustainable development. The research provides a framework for the researchers and academicians to explore the factors that are significant for PES. Since this is a thinly researched area, the findings from the study are expected to be very useful, especially in the Indian context, both for management practitioners related to environmental protection as well as academicians. On the global front, the developing economies having identical social, economic and political structure may gain from generalising the results of the study. Potential bias may arise in spite of taking due care for the design and conduct of the study. Larger samples can provide more information regarding the inexplicable dimensions of the cement sector. As respondents form a common group, the possibility of common source bias for the study cannot be ruled out. Inputs from the focus group study, interviews, and

prevalent literature provided a thorough knowledge of the determinants of PES. The future research may also consider other industrial sectors which follow environmental proactiveness and compare the determinants identified from the study.

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Tables

Table 1: Comparative studies on universal environmental management practices and their determinants

Sl. No.	Researcher(s)	Location and firms	Environmental management practices	Determinants	Method
1	Sharma (2000)	Canadian oil and gas industry	"Pollution prevention, habitat prevention, voluntary restoration, reduction in the use of unsustainable materials and fossil fuels and increased use of environmentally friendly technology"	"Managerial interpretations, issue legitimation, discretionary slack, employee evaluation systems"	EFA and SEM
2	Khanna (2001)	S&P 500 firms based in the U.S.	"Formal written policy, uniform standards to environmental practices worldwide, incentives to employees, environmental audits, environmental performance reporting, funds to cover the costs of penalties for environmental violation or remediation activities, insurance"	"Regulatory pressure, market pressure, firm attributes"	Regression
3	Marshall et al. (2005)	U.S. wine industry	"Land stewardship, developing green labelling and certification program, EMS"	"Employee welfare, environmental values, cost savings, meeting existing and avoiding future regulations"	Qualitative analysis
4	Henriques and Sadorsky (1996)	Largest Canadian firms	"Effective management policy to deal with environmental issues"	"Customer, shareholder, regulatory and community pressures"	Regression
5	Anton et al. (2004)	S&P 500 firms situated in and U.S. and Non-U.S. countries	"Documented environmental policy and environmental code of conduct, environmental audits, environmental certifications, TQEM, environmental regulations, transparent environmental reporting"	"Liability threats, consumer pressure, investors and public pressure"	Regression
6	Darnall et al. (2009)	Manufacturing firms from OECD countries	"Written environmental policy, competitive environmental performance, transparent environmental reporting, environmental accounting, external and internal environmental audits, environmental training program for employees, environmental performance benchmarking"	"Stakeholder pressure"	Regression
7	Liu et al. (2010)	Chinese firms	"ISO 14001 certification, adoption of cleaner technology, waste recycling; innovation, environmental information discloser, environmental cooperation with stakeholders"	"External market pressures, internal factors (learning capacity and environmental strategy orientation)"	Regression
8	Zhu et al.	Chinese	"ISO 14001 adoption; TQEM	"International	Regression

	(2012)	firms	adoption, environmental auditing and regulatory compliance"	institutional pressures, domestic institutional pressure"	(logistic)
9	Vazquez-Brust and Liston-Heyes (2010)	Firms situated in Argentina	"Environmental plan, environmental impact assessment, ISO 14001, environmental training, environmental audit, environmental disclosures, collaboration with environmental NGOs, investment in environmental R&D, environmental policy"	"Managers' core values, basic assumption, and belief, policy and principle of governance, internal and external stakeholders pressure"	Regression analysis
10	Prajogo et al. (2012)	ISO 14001 firms situated in Australia	"ISO 14001 certification"	"Perceived environmental, social and market benefits"	Path analysis
11	Singh et al. (2014)	Indian firms	"Written environmental policy, environmental training for employees, internal/external environmental audits, benchmark environmental performance, environmental accounting, transparent environmental reporting"	"Regulatory pressure, market pressure, societal pressure, firm's characteristics"	Regression
12	Vishwakarma et al. (2018)	Indian power sector firms	"Innovation, environmental stewardship, waste reduction, improved efficiency, alternative fuels, emission reduction, pollution control"	"Institutional pressure, performance improvement, business practices, market pressure and benefits"	EFA, CFA, SEM and Path analysis

Table 2: Level wise classification of respondents

Management Level	Numbers	Percentage
Junior Level	85	27.42
Middle Level	103	33.23
Senior Level	122	39.35
Total	**310**	**100.00**

Table 3: Functional classification of respondents on the basis of the department

Department	Numbers	Percentage
Environment	187	60.32
Maintenance	38	12.26
Marketing	45	14.51
Finance	30	9.68
Others	10	3.23
Total	**310**	**100.00**

Table 4: Reliability analysis

Reliability analysis	
Cronbach's α	No. of Items
0.916	49

Table 5: KMO sampling adequacy analysis and Bartlett's Test of Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.956
Bartlett's Test of Sphericity	Approx. Chi-Square	16583.284
	df	1176
	Sig.	.000

Table 6: Analysis of variance (PCA)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.298	35.301	35.301	17.298	35.301	35.301	12.938	26.404	26.404
2	6.753	13.781	49.082	6.753	13.781	49.082	7.690	15.694	42.098
3	5.548	11.322	60.404	5.548	11.322	60.404	6.813	13.904	56.002
4	4.119	8.406	68.811	4.119	8.406	68.811	5.737	11.708	67.710
5	2.938	5.996	74.807	2.938	5.996	74.807	3.477	7.097	74.807

Table 7: Factorisation of variables

	Component				
	1	2	3	4	5
ID11	.887				
ID10	.887				
ID12	.869				
ID7	.858				
EVO4	.854				
ID3	.851				
NRCER3	.849				
ID5	.844				
ID17	.840				
ID15	.836				
ID4	.835				
EVO5	.830				
NRCER7	.820				
EVO1	.806				
ID16	.773				
EVO3	.755				
EVO2		.856			
EVO8		.842			
EVO7		.822			
EVO6		.817			
NRCER2		.804			
ID14		.778			
NRCER1		.773			
ID2		.724			
NRCER8		.656			
ID13		.618			
ID9		.559			

	Component				
	1	2	3	4	5
ID1			.858		
BPO1			.819		
NRCER5			.809		
BPO3			.807		
BPO2			.801		
BPO9			.792		
BP08			.789		
BPO7			.697		
BPO6			.696		
NRCER6			.521		
ID6				.856	
ID8				.850	
BPO4				.839	
NRCER4				.586	
BPO5				.558	
CT2					.804
SV2					.790
SV1					.784
CT1					.775
CT3					.768
SV4					.708
SV3					.695

Table 8: Summary of Model Fit

Parameters	Value
C_{min}/df	2.695
CFI	.900
RMSEA	.074
TLI	.892
IFI	.900
PCFI	.836
RFI	.838
NFI	.850

Table 9: Testing of hypotheses

	Estimate	S.E.	C.R.	p	Label
PES ↑ Organisational Capability	.366	.039	9.402	***	Supported
PES ↑ Market Benefits	.242	.041	5.840	***	Supported
PES ↑ Environmental Risk Management	.028	.046	.603	.547	Not supported
PES ↑ Stakeholder Pressure	.031	.080	.387	.699	Not supported

***** < 0.001**

Figures

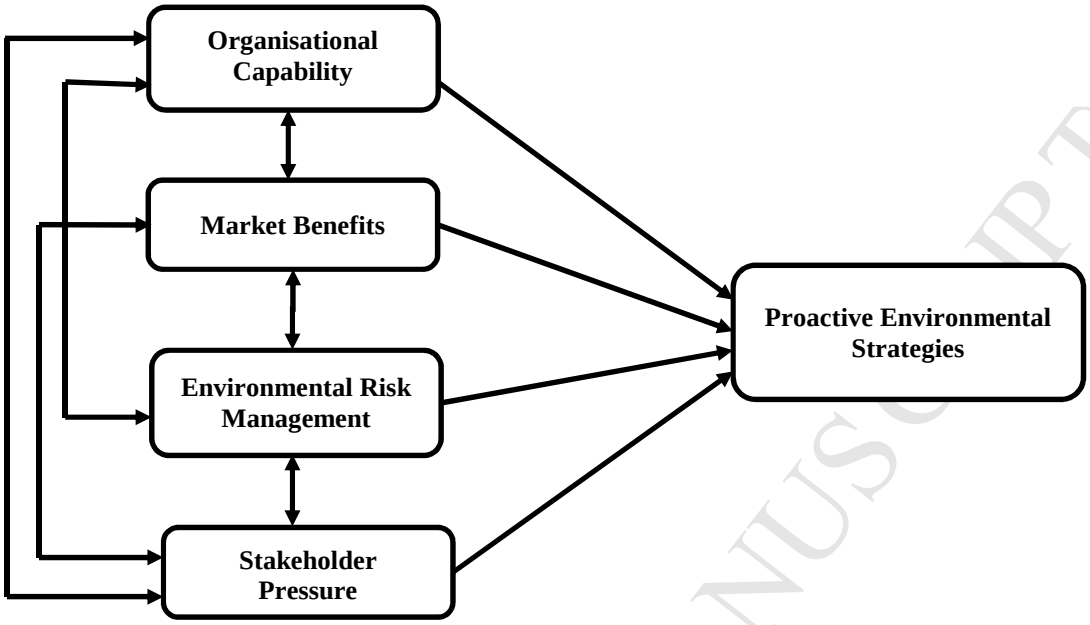

Fig. 1. Hypothesised model

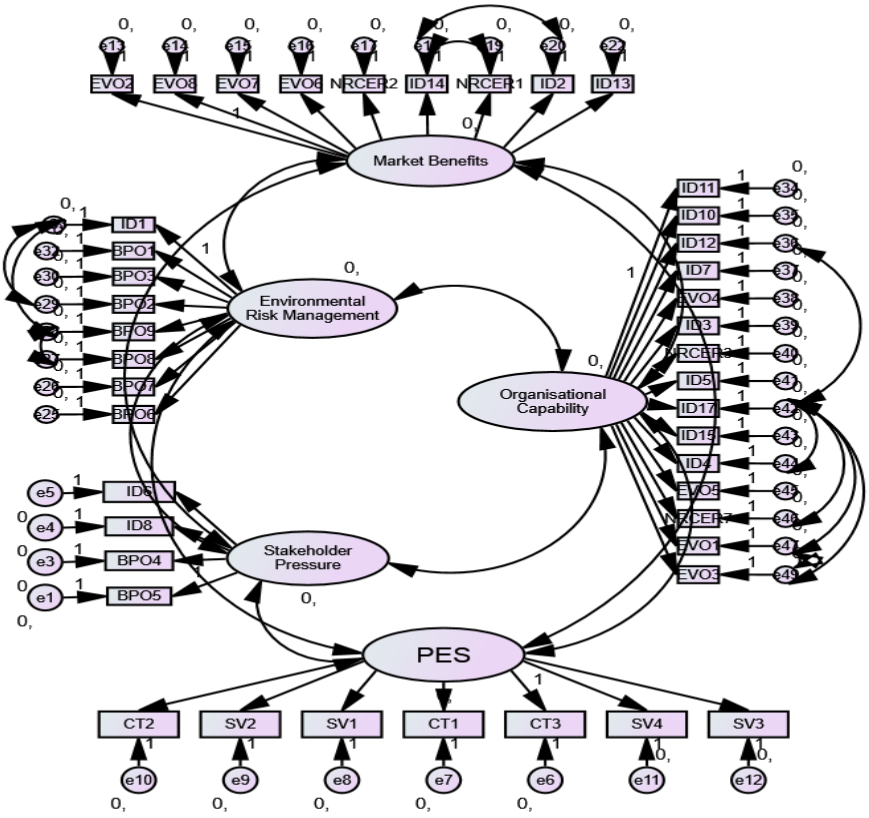

Fig. 2. CFA model

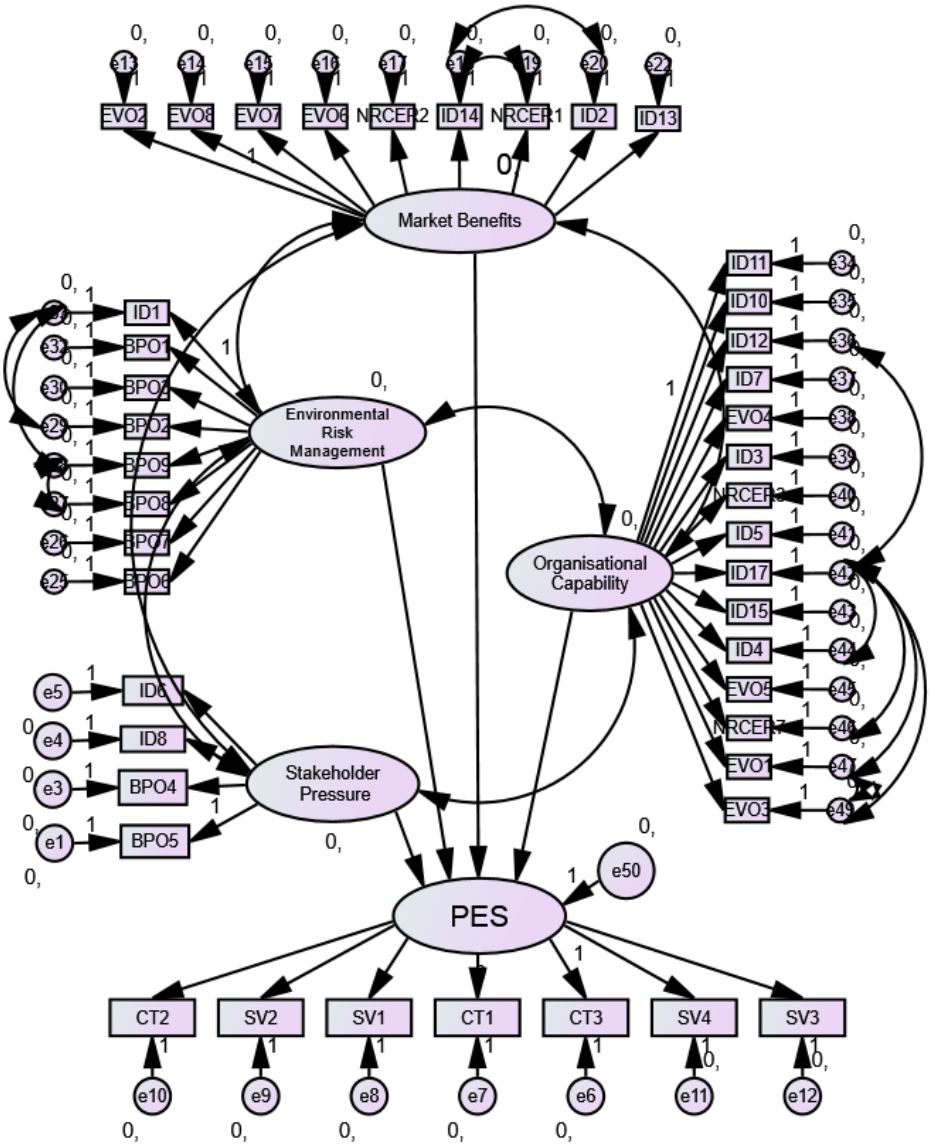

Fig. 3. SEM model

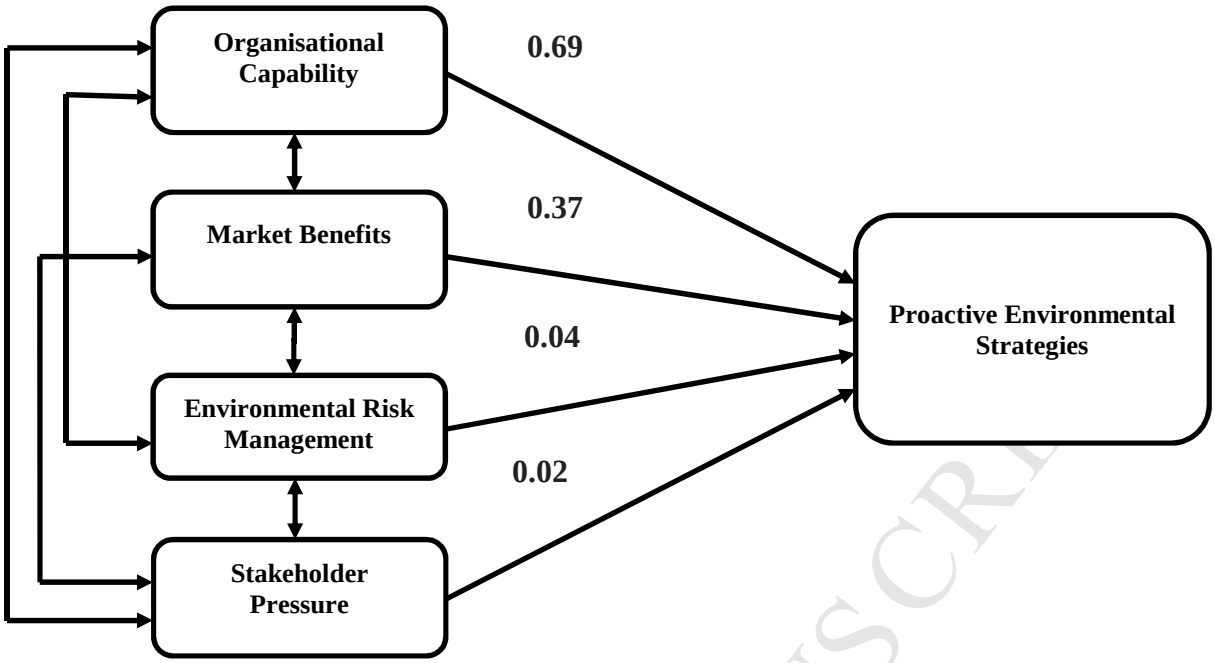

Fig. 4. Path analysis

Highlights

- Emissions from the cement sector in India, which is one of the most emission intensive industry is a major cause of concern
- Cement companies go beyond environmental regulations to adopt proactive environmental strategies (PES)
- The study uses statistical analysis to identify determinants of adoption of PES
- Path analysis ranks organisational capability and market benefits as the two strongest determinants
- The other two determinants identified are environmental risk management and stakeholder pressure