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Analysis

Motivations for implementing environmental management practices in Indian industries

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ABSTRACT

The motivations to implement environmental management system (EMS) practices in Indian industries are explored empirically. The study presents a survey of 104 industries from different sectors to identify the main motivational factors and firms' characteristics that determine the adoption of EMS practices by firms. The empirical evidence suggested that the comprehensiveness of the adopted EMS practices is positively influenced by relational motivations as firms consider their image, compliance and prevention of environmental incidents as significant drivers to implement EMS practices. Firms are also expected to adopt EMS practices to stay competitive if other firms are implementing similar EMS practices. However, the results show that Indian firms do not consider innovation and cost saving as a significant motivation to employ EMS practices. The findings also confirm that larger firms are more likely to adopt comprehensive EMS practices compared to small and medium enterprises (SMEs). The results show that compared to the service sector, firms in manufacturing, chemical and agricultural sectors are more likely to adopt comprehensive EMS practices.

1. Introduction

A growing number of companies globally are now recognizing the importance of sustaining the natural environment. To reduce environmental impacts of their operations, companies are developing new environmental strategies and programs in order to have higher potential environmental benefits (Reid and Miedzinski, 2008; OECD, 2009). The environmental management system (EMS) provides the guidelines based on "plan, do, check, act" model for continual improvement of environmental performance of organizations with respect to their activities/business operations (Carruthers and Vanclay, 2012). It enables integration of business operations and natural environment with the objective of taking a proactive approach to sustain the natural environment. There has been a significant increase in the number of firms, which have adopted and certified their EMS practices (Liu et al., 2010; Prajogo et al., 2012; Carruthers and Vanclay, 2012). This change in business approach has burgeoned the interest of researchers to understand the reasons why firms adopt EMS practices. The motivations for this change in business approach are different, which may include intent of reducing the environmental impact of business operations, creating competitive advantage and improving stakeholder relationship (Bansal and Roth, 2000; Banerjee et al., 2003; González-Benito and González-Benito, 2005; Prajogo et al., 2012; Singh et al., 2014). Cogliance and Nash (2001) emphasized that firms are unlikely to follow systematic management approaches to improve their environmental performance without having comprehensive EMS.

Several studies have been undertaken to empirically examine the relationship between different motivational drivers and adoption of EMS practices (Bansal and Roth, 2000; Fryxell and Szeto, 2002; Potoski and Prakash, 2005; Prajogo et al., 2012). For instance, Bansal and Roth (2000) have identified three basic environmental motivations — competitiveness, social responsibility and legitimation that lead firms to embrace ecologically responsive initiatives, which help in mitigating a firms' impact on overall ecosystem quality. Later, a similar empirical study carried out by González-Benito and González-Benito (2005) for Spanish firms explained environmental motivations as competitive, ethical, and relational to adopt ISO 14001 environmental management standard. Gavronski et al. (2008) have mentioned that external stakeholder pressure, future business and legal concerns and internal influence are the important factors which motivate firms to adopt ISO 14001 in Brazilian companies. Johnstone and Labonne (2009) have also observed that the motivation for introduction of EMS and ISO14001 certification in seven OECD countries is to improve environmental performance. Further, they showed that stakeholders such as market participants and regulatory agencies are important for improving overall environmental performance. However, results reported by Boiral and Henri (2012) have questioned the efficacy of ISO 14001 on environmental performance. De Oliveira et al. (2010) have reported that by greening their operations, firms are enjoying benefits in their operations, including cost reduction, productivity, and innovation. It has also been observed in the literature that the positive impacts of EMS facilitate environmental innovations for developing new products and processes with minimal environmental impacts (Rehfeld et al.,

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2007; Wagner, 2008; Khanna et al., 2009; Demirel and Kesidou, 2011). For example, Carruthers and Vanclay (2012) have observed that the EMS process offers great potential for the improvement of robust management systems that overcome many of the established barriers to the adoption of innovations. However, it has been reported that smaller firms have distinct motivations compared to larger firms to adopt proactive EMS practices (Lepoutre and Heene, 2006). Further, Bowen (2000) has reported that most of these studies show significant correlation between firm size and environmental performances. Morrow and Rondinelli (2002) while comparing large corporations in the United States with five small and medium-sized energy and gas companies in Germany reported that these German companies had similar motivations to adopt EMS practices but somewhat different priorities. These German energy and gas companies were primarily motivated to improve documentation, regulatory compliance and increase the efficiency of their operations. Anton et al. (2004) and Etzion (2007) have reported that the larger firms which have more resources are likely to adopt more comprehensive EMS practices compared to smaller firms. Thus, this study is aimed to identify new empirical evidence regarding the factors that motivate firms to adopt EMS practices and extend the previous research in two important ways. First, this study examines the comprehensiveness of EMS by using composite variables to include different EMS practices that capture the systemic and integrated efforts of planning, implementation and monitoring in order to improve firms' environmental performance instead of the adoption of single environmental practice that has been the focus of earlier research. Since the adoption of EMS practices is voluntary, firms show significant variations in the adoption level of EMS practices. Therefore, it is informative to consider the comprehensiveness of EMS through composite variables rather than a single environmental practice. Secondly, most of the current studies are in the context of the developed countries having different politic, economic, social and technological conditions compared to developing countries. Thus, the motivations to adopt proactive environmentalism in developing countries are expected to be quite different from the motivations in developed countries. Furthermore, the limited numbers of studies that have been conducted in the developing countries have not specifically and fully explored the motivational factors and their relationship with proactive environmentalism (Sangle, 2010; Gangadharan, 2006; Seroa da Motta, 2006; Zhang et al., 2008). This study addresses this gap and investigates different motivational factors that influence the adoption of EMS practices in Indian firms. The study draws on the comprehensive research survey data collected during 2011–12 to investigate the EMS practices of Indian firms and would be the first of its kind for Indian industries. The analysis would be particularly relevant in the context of developing countries which have similar industrial growth potential in the region and therefore, would provide a better understanding of factors that motivate firms to adopt voluntarily EMS practices. This understanding would help managers, policy makers and regulators determine the relative efficacy of different motivational measures and firms' characteristics that facilitate the adoption of EMS practices in similar settings.

2. Theoretical Perspective and Hypothesis Development

The existing empirical research has shown that firms' motivation to adopt EMS practices is influenced by different factors. The theoretical perspectives based on institutional theory suggest that organizations are motivated to increase their internal efficiency and external legitimacy (Bansal and Roth, 2000; Bansal and Hunter, 2003; Khanna and Anton, 2002). While the resource based perspective postulates that firms' resources and capabilities lead to the adoption of proactive environmental strategies to gain competitive advantage (Aragon-Correa and Sharma, 2003; Darnall and Edwards, 2006; Lopez-Gamero et al., 2009). Prajogo et al. (2012) suggest institutional and resources based perspective as complementary for a more comprehensive explanation on the motives and benefits implications of EMS practice adoption. Based on these theoretical perspectives the implication of different drivers on the comprehensiveness of firms' EMS practices (CEP) can be hypothesized and represented schematically as shown in Fig. 1. This study considers four different motivations i.e. relational, innovative, operational and business competitiveness. Each motivation is influenced by related variables (indicator/proxy) and leads to the adoption of different EMS practices (Bansal and Roth, 2000; González-Benito and González-Benito, 2005). The comprehensiveness of EMS practices adopted is measured as the sum of different EMS practices being adopted by the firms (Anton et al., 2004). These motivations and their relationship to the comprehensiveness of adopted EMS practices are described below to develop different hypotheses.

2.1. Relational Motivations

Firms implement environmental practices in an attempt to legitimate their actions according to the established regulations, norms, values and beliefs (Suchman, 1995; Bansal and Roth, 2000). The firms might seek to establish healthier relationship with their stakeholders by adopting EMS practices for better regulatory compliance, preventing and controlling environmental accidents and developing capabilities for the integration of local communities. This could drive potential strategic benefits, which include firms' image and reputation as being socially responsible (González-Benito and González-Benito, 2005). Thus, the adoption of EMS practices may be viewed as an indication of firms' commitment to adopt comprehensive EMS practices for improved relationship with their stakeholders. Therefore the following hypothesis is proposed:

Hypothesis 1. *The adoption of comprehensive EMS practices by a firm is positively related with relational motivations, i.e. the stronger the firm's perception that adoption of EMS can improve its relationship with its stakeholders, the higher the chances that the firm will adopt more comprehensive EMS practices.*

2.2. Innovational Motivations

Previous studies have analyzed the effect of EMS practices on environmental technological innovation (Renning et al., 2006; Wagner, 2008; Kesidou and Demirel, 2012). Wagner (2008) reported that the adoption of EMS practices facilitated the development of strategic resources, which have positive impact on the innovation capabilities in general. Renning et al. (2006) have supported this view by confirming the importance of Eco-Management and Audit Scheme (EMAS) for environmental innovations among certified facilities in Germany. Kesidou and Demirel (2012) also stressed the importance of organizational capabilities related to EMS for eco-innovation and emphasized that such organizational capabilities are not only significant to undertake innovation activities but also play an important role in increasing the level of resources allocated for innovation. The OECD (Organizations for Economic Co-operation and Development) project also aims to promote the concept of eco-innovation to stimulate the development of new technologies and systemic solutions to global environmental challenges (OECD, 2009). Thus, environmentally responsive firms are able to promote the development of modern technologies and products which are more environment-friendly to minimize emissions and waste, by cutting down the amount of inputs used for production and/or by substituting the inputs with more environment-friendly alternatives. Hence, the following hypothesis is proposed.

Hypothesis 2. *The comprehensiveness of adopted EMS practices by a firm is positively related with innovational motivations, i.e. the stronger the firm's perception that adoption of EMS can promote innovation to develop new technology and products, the higher the chances that the firm will adopt more comprehensive EMS practices.*

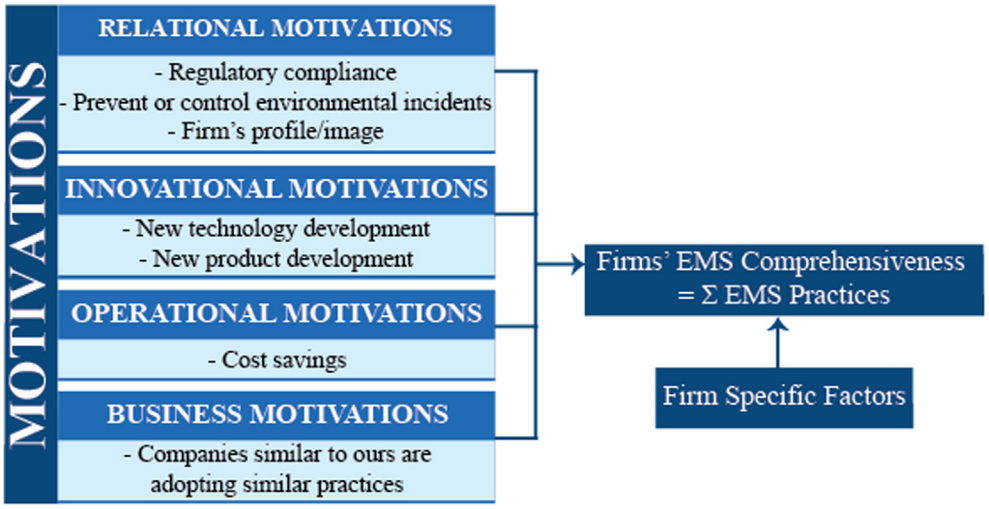

Fig. 1. Conceptual framework showing motivations for adopting EMS practices.

2.3. Operational Motivations

Firms strive to be competitive by cutting down their operational costs. To achieve competitiveness, the firms attempt to minimize their emissions and wastes to achieve lower costs and better profitability (Hart, 1995). Previous studies postulate that although firms take voluntary actions to adopt EMS to improve their environmental performance, their actions are still based on profit maximization and firms choose the desired level of EMS to maximize their profit (Lutz et al., 2000). Therefore, the following hypothesis is postulated.

Hypothesis 3. *The comprehensiveness of adopted EMS practices by a firm is positively related with operational motivations, i.e. the stronger the firm's perception that adoption of EMS can promote operational competitiveness to lower costs, the higher the chances that the firm will adopt more comprehensive EMS practices.*

2.4. Business Competitiveness Motivations

Firms attempt to match their performances with their peers to remain competitive in their business segment. To achieve this, firms benchmark their performance with the best in their business so that they can improve the performance of their business. This motivates firms to adopt environmental practices being followed by similar firms (within the industry) to remain competitive in their field. Therefore, the following hypothesis is proposed:

Hypothesis 4. *The comprehensiveness of adopted EMS practices by a firm is positively related with business motivations, i.e. the stronger the firm's perception that adoption of EMS can promote business competitiveness, the higher the chances that the firm will adopt more comprehensive EMS practices.*

2.5. Firm Specific Characteristics

Individual characteristics of firms are also important determinants of their environmental management performance (EMP) levels (Singh et al., 2014). This study investigates the effect of firm size, age and sector on the comprehensiveness of EMS practices adopted by firms. Previous studies showed significant positive correlation between firm size and its environmental performance as larger firms are more likely to improve their environmental performance to reduce their operational impact on the natural environment. The reasons attributed to this association are that large firms having more visibility are expected to draw more attention from stakeholders and can allocate greater resources towards improving their environmental performance (Etzion, 2007; Darnall et al., 2009). The firm's age also determines their ability to respond to the adoption of proactive environmental practices (Portney and Stavins, 2000; Sørensen and Stuart, 2000). Older and well established firms having capital assets and mature technological knowledge will be more reluctant to integrate or adopt EMS practice compared to younger firms, which are better equipped to pursue comprehensive environmental practices. Sectoral characteristics are also relevant as less pollution intensive sectors (i.e. service sector) require and adopt a lesser number of EMS practices compared to more pollution intensive sectors (i.e. manufacturing, chemical and agriculture). Therefore, industrial sector intrinsically incorporates or relates to other dimensions which influence the adoption of EMS practices (Seroa da Motta, 2006). Therefore the following hypotheses are proposed:

Hypothesis 5a. *The comprehensiveness of adopted EMS practices by a firm is positively related with its size i.e. the larger the size of the firm, the greater the chances that the firm will adopt more comprehensive EMS practices.*

Hypothesis 5b. *The comprehensiveness of adopted EMS practices by a firm is negatively related with its age i.e. newer firms are more likely to adopt comprehensive EMS practices compared to older firms.*

Hypothesis 5c. *The comprehensiveness of adopted EMS practices by a firm is influenced by its sector type i.e. compared to the service sector, other sectors are expected to adopt more comprehensive EMS practices.*

3. Material and Methods

3.1. Sample Survey and Questionnaire

The primary empirical data for the study has been drawn from a comprehensive research survey and field interviews. Multiple industries have been chosen to investigate the proactive environmental behavior of several industries for generalization rather than limiting the study to isolated cases of particular industrial segments as examined in previous studies (Barla, 2007; González et al., 2008; Massoud et al., 2010; Marshall et al., 2010; Parast et al., 2011; de Abreu et al., 2012; Pereira-Moliner et al., 2012).

To increase face validity, the research questionnaire was initially developed and pilot tested with different respondents. These respondents represented a variety of positions and functions within their firms, which are located in the industrial areas of the National Capital Region (NCR) of Delhi and neighboring States. To ascertain content validity,

the questionnaire covered different EMS practices, with the aim to establish measures and variables to investigate firm motivations to adopt proactive EMS practices (Anton et al., 2004; González-Benito and González-Benito, 2005).

The questionnaire was sent to 1225 firms listed by The Energy and Resources Institute (TERI) — Business Counsel for Sustainable Development (BCSD) and Indian Product Promotion Center. A total of 187 responses were received, out of which 104 were found to be complete and valid constituting a response rate of 8.5%, which is consistent with previous studies (Alreck and Settle, 1995; Christmann, 2000; Melnyk et al., 2003; Liu et al., 2010).

The sample firms include respondents from sixteen different industries grouped into four sectors i.e. manufacturing, agriculture, chemical and service according to National Industry Classification (NIC, 2008). In terms of firm size, the sample is further divided into small and medium enterprises (SMEs) and large enterprises.[1] The respondents comprise 43% from SMEs and 57% from large Indian enterprises. The firms from manufacturing sector have a maximum number of respondents followed by agriculture, service and chemical sector. The size, scale wise and sector wise distributions of 104 valid responses from different industries have been shown in Fig. 2.

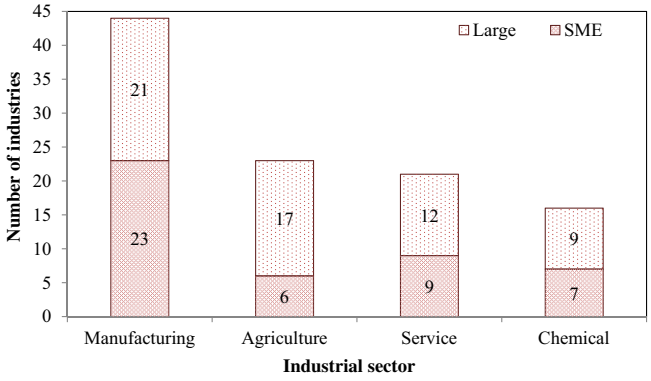

Fig. 2. Sector and size scale wise distribution of industries.

3.2. Analytical Framework

Multiple regression analysis has been employed to test the hypotheses. In the analysis, the CEP is hypothesized to be determined by different motivational factors and firm characteristics. The motivational variables are indicated by the vector 'M' and firms' characteristics such as size, age and sector are indicated by a vector 'C'. These variables are hypothesized to determine the overall CEP of a firm. Accordingly, a firms' CEP can be presented in the form of a regression (econometric) model (Seroa da Motta, 2006; Liu et al., 2010).

$$\mathrm{CEP} = f(\mathbf{M}, \mathbf{C}) \tag{1}$$

where

M [relational motivation (RM), innovational motivation (IM), business competitiveness motivation (BCM), operational motivation (OM)]

C [size, age, sector]

To capture the functional relationship between CEP and the determinants as expressed in Eq. (1), a regression equation can be constructed and expressed as in Eq. (2).

$$\mathrm{CEP} = \alpha_0 + \alpha_1 \mathrm{RM} + \alpha_2 \mathrm{IM} + \alpha_3 \mathrm{BCM} + \alpha_4 \mathrm{OM} + \alpha_5 \mathrm{Size} + \alpha_6 \mathrm{Sector} + \alpha_7 \mathrm{Age} + \varepsilon \tag{2}$$

where α_0 represents the constant term, ε represents the error term and α_i represents the coefficients for various motivations and firms characteristics.

The data corresponding to responses of the firms have been analyzed using principal component analysis (PCA) in order to assess the construct validity. The internal reliability has been assessed using Cronbach-α. Each set of variables belonging to the same dimension (construct) is reduced to a summated scale by means of average score of their values using factor analysis. The subsequent subsections provide a description of variables and constructs used to test the above hypotheses.

3.2.1. Dependent Variables

The CEP is the dependent variable in the study. The CEP is perceived as a reflective measure in the sense that all observed proxy indicators (or simply proxies) are viewed as being caused by some underlying common dimension and is measured by different proxy indicators (Bagozzi, 1982). Previous studies described various ways of quantifying the CEP (Paragal et al., 1997; Dasgupta et al., 2000; Anton et al., 2004; Darnall et al., 2008). The CEP in the present study has been measured through eight proxy indicators (EMS practices) as shown in Table 1. To quantify the CEP, the eight proxy variables were given a score of 1 or 0 depending on whether a firm has adopted a given EMS practice (proxy) or not. The total score on each proxy variable for each respondent firm was computed. Thus, a firm that adopts all practices can have a maximum CEP score of 8, and a firm which does not adopt any practice can have a minimum CEP score of 0. To assess the construct validity of CEP, factor analysis is performed and results are used to evaluate the reliability of the composite variable CEP based on different statistical criteria (Hair et al., 2006). The results of factor analysis are shown in Table 1. The estimated factor loadings are in the range of 0.60 to 0.82. This indicates high convergence as all loadings are greater than 0.50. The average variance extracted is 0.55 which is greater than the accepted threshold of 0.50, further indicating an adequate convergence. The composite reliability (Cronbach's alpha) indicating internal consistency of CEP is 0.88 which is greater than the accepted threshold of 0.70 indicating that CEP has adequate internal consistency. Table 1

Table 1
CEP proxy indicators and their statistical summary.

EMS practices (construct items)	CEP	Statistical summary of construct items			
	Factor loadings	Mean	SD	Max	Min
Written environmental policy	0.763	0.59	0.24	1	0
Environmental training for employees	0.807	0.66	0.23	1	0
Internal environmental audits	0.797	0.63	0.23	1	0
External environmental audit	0.694	0.45	0.25	1	0
Benchmark environmental performance	0.819	0.56	0.25	1	0
Environmental accounting	0.599	0.36	0.23	1	0
Public environmental report	0.737	0.45	0.25	1	0
Environmental performance indicator/goals	0.703	0.50	0.25	1	0
Average variance extracted	0.552				
Cronbach's alpha (reliability)	0.882				

Extraction method: Principal component analysis.

[1] According to 'the Micro, Small and Medium Enterprises Development Act 2006,' thresholds for enterprise engaged in the manufacturing or production of goods: for small enterprises 2.5 < capital cost < 50 million rupees; for medium enterprise 50 < capital cost < 100 million rupees and for large enterprise capital cost > 100 million rupees. These thresholds for enterprise engaged in providing or rendering services: for small enterprises 1.0 < capital cost < 20 million rupees; for medium enterprises 20 < capital cost < 50million rupees and for large enterprise capital cost > 50 million rupees (Ministry of Micro, Small and Medium Enterprises, 2006).

shows these statistics for the proxy variables (construct items) and for the composite variable CEP.

3.2.2. Independent Variables

Section 3.2 explains that different motivations i.e. relational, innovational, business, and operational are independent variables as shown in Eq. (2). Table 2 shows a statistical summary of firms' responses corresponding to different motivational variables measured on 3-point likert scale (not important (0); moderately important (1) and very important (2)). The relational motivations are measured using three proxy indicators i.e. regulatory compliance, prevent and control environmental incidents and firms' profile/image. Similarly, the innovational motivations are measured using two proxy indicators i.e. new technology development and new product development. The business competitiveness motivations are represented by proxy indicator "companies similar to ours are adopting similar practices" and operational motivations are represented by proxy indicator "cost saving". Table 3 shows these motivations and factor analysis to explain the underlying constructs (factors). The analysis shows two factors expressing large eigenvalues (2.9, 1.1) and together explains ~81% of the total variance (with subsequent varimax rotation). The factor analysis shows that factor 1 corresponds to relational motivation and factor 2 represents the innovational motivation. Table 3 also shows the factor loadings for these five motivations variables. The communalities indicate the total variance of a motivation variable that is explained by these factors. The reliabilities (Cronbach's alpha) indicating the internal consistency of these factors are evaluated as 0.71 and 0.76, respectively. As these reliabilities are greater than the accepted threshold of 0.70, these factors have adequate internal consistency (Hair et al., 2006).

3.2.3. Control Variables

The control variables represent the characteristics (**C**) of the firms in context to size, sector and age. Previous studies measured the size of the firm by using different indicator variables, which include total number of employees (Darnall et al., 2009), annual turnover (Liu et al., 2010) and total asset and sales (Zeng et al., 2011). In the present study, the size of the firm is measured by using different indicator variables using total number of employees, capital cost and the total turnover. The respondents were also requested to categorize their firm as small, medium and large. Accordingly, the firms have been grouped into three categories as small (1), medium (2) and large (3) for evaluation. The natural logarithm of employee numbers is used in the analysis to transform the skewed distribution to yield consistent results (Agarwal, 1979; Darnall et al., 2009). Factor analysis shows that these indicator variables of the firm size can be represented by a single factor as shown in Table 4. The first factor has large positive eigenvalue (~3.7) and accounts for ~75% of the total variance. The communalities indicate the total variance of a variable that is explained by the factors. The Cronbach's alpha (reliability) is 0.91 indicating adequate internal consistency of the factor 'firm size'. The details of factor analysis and statistical summary of variables are shown in Table 4. The firms are also categorized as new, having age ≤10, and old, with age >10 years. This categorization is represented numerically as '1' for new and '2' for old firms in the analysis. Dummy variables are used to categorize the firm into four different sectors i.e. manufacturing, agriculture, chemical and service sector.

Table 2
Statistical summary of different motivational factors (independent variables).

Motivations	N	Mean	SD	Max	Min
Relational motivations					
Regulatory compliance	104	1.61	0.64	2	0
Prevent or control environmental incidents	104	1.66	0.65	2	0
Firm's profile/image	104	1.54	0.68	2	0
Innovational motivations					
New technology development	104	1.43	0.76	2	0
New product development	104	1.33	0.82	2	0
Business competiveness					
Companies similar to ours are adopting similar practices	104	0.92	0.83	2	0
Operational competiveness					
Cost saving	104	1.58	0.66	2	0

Table 3
Factor analysis of relational and innovational motivation.

Variable	Factor loadings		Communality
	Relational motivation	Innovational motivation	
Regulatory compliance	**0.881**	−0.192	0.813
Corporate profile/image	**0.840**	−0.105	0.717
Prevent or control environmental incidents	**0.817**	−0.318	0.769
New tech. development	0.254	**−0.901**	0.876
New product development	0.158	**−0.931**	0.893
Variance	**2.239**	**1.827**	**4.067**
% Var	**0.448**	**0.366**	**0.813**

Loadings stronger than ±0.50 are in bold.
Extraction method: Principal component analysis; rotation method: Varimax.

4. Results and Discussion

The stepwise regression is performed to test the hypothesis concerning effect of different motivational and firm characteristics on the CEP. This is achieved by evaluating the relationship between the dependent variable CEP, and independent variables related to motivational factors and firm characteristics as expressed in Eq. (2). A correlation matrix, which provides a measure of association between dependent and independent variables, is shown in Table 5. The stepwise regression identifies a useful subset of predictor variables having greater explanatory power. It adds and eliminates independent variables based on a defined criterion for their regression coefficient (alpha to add ≤0.1 and alpha to eliminate ≤0.1). However, for better insights, the stepwise inclusion of significant motivational factors and their effect on firms' CEP is examined at each step after controlling the effect of firm characteristics. Accordingly, an initial null model consisting of control variables only (Model 1) is estimated first. This will discount the effect of control variables in order to properly assess the explanatory power of all the other motivational variables. Subsequently, the motivational variables are introduced progressively at each step in the regression equation (Models 2 and 3). Table 6 shows the details of all these models and a subset of motivational variables that are retained finally in stepwise regression model (Model 3). The model fit is determined by estimation of R square (R^2), adjusted R-squared (R^2_{adj}) and R-squared (predicted) values which indicate the percentage of total variation in CEP explained by the regression model. The model significance is investigated using F ratios.

Table 4
Factor analysis of firm size.

Variable	Factor loadings	Mean	SD	Max	Min
	Factor 1 (firm Size)				
Total capital	**0.93**	2.63	0.61	3.00	1.00
Size scale	**0.92**	2.47	0.67	3.00	1.00
Log (no. of employee)	**0.85**	2.62	0.66	3.85	1.00
Turn over	**0.84**	2.77	0.53	3.00	1.00
Log (no. of full time employee)	**0.77**	1.08	0.36	1.57	0.00
Variance	**3.74**				
% Var	**74.80**				
Cronbach's alpha	**0.91**				

Loadings stronger than ±0.50 are in bold.
Extraction method: Principal component analysis; rotation method: Quartimax.

Table 5
Correlation matrix.

		1	2	3	4	5	6	7
1	CEP	1.00						
2	Firm size	**0.38 (0.00)**	1.00					
3	firm age	0.04 (0.66)	**0.54 (0.00)**	1.00				
4	Relational motivations	**0.39 (0.00)**	**0.26 (0.00)**	0.16 (0.10)	1.00			
5	Innovational motivations	**0.26 (0.01)**	0.07 (0.44)	0.03 (0.78)	**0.44 (0.00)**	1.00		
6	Operational motivation	**0.30 (0.00)**	0.17 (0.09)	0.06 (0.54)	**0.59 (0.00)**	**0.54 (0.00)**	1.00	
7	Business competiveness motivations	**0.32 (0.00)**	0.14 (0.17)	0.12 (0.22)	**0.38 (0.00)**	**0.39 (0.00)**	*0.24 (0.014)*	1.00

P value in parenthesis.
All bold significant at the $p < 0.01$.
All italic significant at the $p < 0.05$.

The final model (Model 3) provides the estimates of the regression parameters to test the hypothesis concerning different motivational and control variables as explained in Eq. (2). The R^2 value of the final regression model is 0.37 and R^2_{adj} value is 0.32. The predicted R^2_{pre} value for the final model is 0.26. The F ratio value of 8.16 of the final model demonstrates that the model is significant at 1% level of significance.

The analysis shows that each of the estimated coefficients (Model 3) on the motivational variables (relational, innovational, operational and business competition) is positive and significant for two motivational variables. The estimated coefficient for relational variables is significant at 5% level of significance. This evidence provides that hypothesis H1 is acceptable at 5% level of significance as firms consider relational motivation as significant determinant of the CEP. Similar results have also been reported by earlier studies (Suchman, 1995; Bansal and Roth, 2000). González-Benito and González-Benito (2005) mentioned that Spanish firms consider relational motivation important by following actions according to the established regulations and being socially responsible. The estimated coefficient for business competition motivation is also significant at 5% level of significance and offer support to the hypothesis H4 that business competition motivation is an important determinant of CEP, thus confirming that firms adopt EMS practices to match the environmental practices of their business competitors within their industry to remain competitive.

The results, however do not support the hypotheses H2 (innovational motivation) and H3 (operational motivation). Table 6 illustrates that innovational and operational motivations are not significant determinants to explain CEP of a firm. Previous studies conducted in other countries have also investigated the importance of EMS for (eco) process and product innovation (Wagner, 2008; Khanna et al., 2009; Horbach et al., 2012). The implementation of EMS which facilitates eco-innovation is seen as the reflection of the strong organizational capabilities of firms in environmental management (Wagner, 2008; Horbach, 2008). Horbach et al. (2012) in their study of German Community Innovation Survey (CIS) consisting of 7061 firms from mining, manufacturing, energy, water supply and a large number of service sector firms remained inconclusive about the effect of organizational innovation such as EMS on the environmental process and product innovation. Ziegler and Nogareda (2009) also reported that the causal relationship between

Table 6
Results of stepwise regression and hypothesis testing.

Regression steps and models (alpha to enter: 0.1); (alpha to remove: 0.1)		Stepwise regression model			Hypothesis and evidences
		1	2	3	
		Initial null model	Intermediate model	Final model	
Variables		Regression coefficients			
Constant		0.22	−1.21	−1.01	
Control variables (firm characteristics)	Firm size	2.16	1.85	1.83	H5a accepted at 1% significant level
	P-value	0.00	0.00	0.00	
	Firm age	−1.6	−1.66	−1.76	H5b rejected at 10% significant level
	P-value	0.033	0.020	0.012	
	Industrial sector dummy*				
	Manufacturing	1.65	1.46	1.45	H5c accepted at 5% significant level
	P-value	0.018	0.027	0.025	
	Chemical	2.32	2.26	2.03	
	P-value	0.008	0.006	0.013	
	Agriculture	2.07	1.81	1.93	
	P-value	0.009	0.017	0.010	
Motivations	Relational motivations		1.53	1.15	H1 accepted at 5% significant level
	P-value		0.001	0.014	
	Innovational motivations	Non-significant at alpha = 0.1			H2 rejected at 10% significant level
	P-value				
	Operational motivation	Non-significant at alpha = 0.1			H3 rejected at 10% significant level
	P-value				
	Business competiveness motivations			0.69	H4 accepted at 5% significant level
	P-value			0.029	
Model statistics and significance					
R-Sq		25.77	34.10	37.30	
R-Sq (adj.)		21.98	30.03	32.72	
R-Sq (pre.)		16.17	24.34	26.17	
F value for model fit		6.80	8.37	8.16	
Model Significance (P values)		0.00	0.00	0.00	

* Omitted sector is service.

the EMS and technological environmental innovations for the German manufacturing sector is ambiguous. Kesidou and Demirel (2012) in a study of 1566 UK firms suggested that firms initiate eco-innovations in order to satisfy the minimum customer and societal requirements; however, the increased investment in eco-innovation is stimulated by factors such as cost saving, firm organizational capabilities related to EMS and stricter regulations.

The model also evaluates the effect of firm characteristics (control variables) on the CEP. It shows that firm size is positively related to the firm's CEP. It is a significant determinant of the CEP as the estimated coefficient for firm size is significant at 1% level of significance. This provides support to hypothesis H5a that size of the firm is positively related to CEP. This is consistent with the previous studies, wherein the effect of firm characteristics on its environmental performance has been investigated. The larger firms having more resources (represented by its size) are likely to adopt more comprehensive EMS practices as compared to smaller firms (Anton et al., 2004; Zhang et al., 2008; Darnall et al., 2009; Nishitani et al., 2012; Singh et al., 2014).

The results also show a negative effect of firm age on CEP; however, further investigation shows that the relationships among CEP, 'firm size' and 'firm age' are an example of a net suppressor effect in which 'firm age' is positively correlated with CEP but has a significant negative regression coefficient. The basic purpose of 'firm age' is to suppress the error variance in 'firm size' rather than explain much about CEP. The appropriate inference is that 'firm age' has a positive but non-significant influence on CEP and thus rejects the hypothesis H5b (Cohen and Cohen, 1975; Olson et al., 2005). The regression results signify that manufacturing, chemical and agriculture sectors adopt more comprehensive EMS practices compared to service sector. The estimated coefficients of manufacturing, chemical and agriculture sector are significant at 5% level and provide support to hypothesis H5c. This confirms the similar results in literature, wherein pollution intensive firms adopt more comprehensive environmental practices compared to less pollution intensive firms (Henriques and Sadorsky, 1996; Seroa da Motta, 2006).

5. Conclusion

This study empirically explores the multifaceted relationship between different motivational factors and firms' characteristics to determine the CEP adopted across different industries in India. Seven different motivational factors and three characteristic variables have been investigated for Indian industries. The motivational variables are combined using factor analysis to form two constructs of relational and innovational motivations. The empirical results show that firms consider relational motivations as a significant driver influencing environmental responsiveness, indicating that firms are more likely to adopt CEPs, for better compliance, prevention of environmental incidents and to portray the image of an environmentally responsive firm. The firms are also motivated to adopt EMS practices to remain competitive in business by following the same environmental standards as their peers in the market. The analysis further suggests that innovational and operational motivations are not significant factors to adopt EMS practices. The analysis also determines that firm characteristics (size, age and sector) add more explanatory power to determine the CEPs of firms. This reveals that the larger firms having large resources and capabilities adopt more comprehensive EMS practices compared to SMEs. The findings also signify that industrial sector intrinsically influences the adoption of EMS practices as pollution intensive firms adopt more comprehensive EMS practices. These results support the broad findings of the previous studies; this consistency would provide an important foundation for transforming academic research into effective policies.

This study has some limitations and therefore provides opportunities for future extensions of this research. In the case of cross sectional studies, the research findings bear replications in other time periods and regions. A longitudinal study over a period of time would provide better insights into how the evolution of different motivational factors affects the adoption of EMS practices. It also remains poorly understood whether the adoption of proactive EMS practices contribute to actual improvements in environmental performance especially in a developing country like India. Future research is required to examine this effect more closely given the possibility that developing countries might adopt EMS practices more symbolically instead of having an intention to improve environmental performance.

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