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Journal of Environmental & Earth Sciences
https://ojs.bilpublishing.com/index.php/jees

ARTICLE

Are Environmental Vanguard Firms More Proactive Towards Environmental Conservation? An Empirical Study of Power Sector Firms in India

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ARTICLE INFO

Article history
Received: 12 June 2019
Accepted: 15 August 2019
Published Online: 30 October 2019

Keywords:
Proactive environmental strategies
Environmental vanguard
Statistical analysis
Power sector
Structural equation modelling

ABSTRACT

Environmental protection is a crucial issue for environmentalists and researchers. Almost every stakeholder in the industrial production process of a product is concerned about the detrimental effects on the environment due to emissions. Though environmental regulations are in place, some firms across diverse industrial sectors are considered as the environmental vanguard, i.e., leaders in environmental protection. Does being environmental vanguard result in environmental proactivity? This paper, through an empirical study of Indian power sector firms, studies the environmental proactivity of the firms who are known to be leaders in the adoption of environmental protection norms. A questionnaire-based survey method is used to analyse the responses statistically. The study uses 280 responses for the analysis of the data. Eight hypotheses are proposed and tested statistically through Structural Equation Modelling (SEM). The statistical analysis reveals that the firms who are environmental vanguard are more proactive towards environmental protection. The findings of the study can be useful for the policymakers and environmental managers in the formulation of policies which can be considered as a benchmark for the firms for the protection of the environment.

1. Introduction

This paper analyses empirically the proactive environmental behaviour of environmental vanguard firms having their operations in emission intensive areas.Growing number of firms are concerned towards sustainability.

These companies target their operations to reduce their impact on the environment and are in the process of envisaging new techniques to derive greater environmental advantages [1, 2]. Firms adopt environmental management system which provides "plan, do check, act" model guidelines to improve their environmental performance considering their manufacturing activities [3,4,5]. This Change in perspective of the firms towards environmental damage has created an interesting field of study for the researchers. There may be various reasons which involve concern towards the emissions from the manufacturing process; firms' reputation, proactive corporate policy, product and brand differentiation, innovation, customers concern and cost savings and liability reduction [6,7]. According to a study environmental innovations can be defined as ".....

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 DOI: https://doi.org/10.30564/jees.v1i2.905

measures of relevant actors (firms, private households), which: (1) develop new ideas, behaviour, products and processes, apply or introduce them, and (2) contribute to a reduction of environmental burdens or to ecologically specified sustainability targets" [8]. Apart from environmental innovations, a distinction can be made towards product and process innovations [9,10,11]. A study mention, that by minimising their emissions and waste, firms can benefit from their operations, which includes cost savings, higher productivity, and innovation [12]. The firms in the U.S. have substantially increased their expenditure towards environmental protection since the 1970s with the further expected increase in future [13]. Considering the quantum of expenditure required towards environmental protection, it has become imperative for the companies to incorporate it into their formal business plan [14]. Some studies report that the firms adopting environmental management strategy can gain sustainable competitive advantages [15]. According to some arguments, a firm can enhance its performance by adopting a proactive environmental strategy through process innovation and product differentiation [16, 17]. In 1975, 3M company in the U.S.A. created a new path for controlling pollution by adopting the approach of preventing the waste generation at the initial stage itself. The 3P programme (Pollution Prevention Pays) became a role model for the other companies over the next two decades. The responsibility of the identification of waste reduction prospects was for the first time handed over to line workers and employees in place of environmental engineers and legal experts [18]. Environmentalists like [16, 19], and many others [e.g., 20, 21, 22] endorsed the view of the companies following the 3M model. Control or prevention can reduce emission. Different strategies are adopted to reduce emission through either of the two options [21, 23, 24].

Several studies, mention efforts made by few companies to achieve better corporate environmental management and gain competitive advantage by adopting environmental strategies and using environmental management accounting [25, 26]. The commitment of top managers of environmental vanguard firms helps in achieving an enhanced competitive advantage [16, 27].

Many researchers have contributed to the field of factors governing the environmental proactiveness of firms throughout the globe. However, very few studies are available which contribute to such studies of Indian firms. The Indian power sector has grown tremendously over the decades. Thermal power has a majority share of total power generation. Thermal power generation primarily uses coal. The technical and commercial losses in the power sector were one of the highest in India. Incorporation of better technologies has helped in reducing losses. The power sector in India, which was a state dominated sector, was opened up for private firms in the early 1990s. Competition ensured advanced technologies to make better use of input fuels and to increase the output. Pressure from the regulatory authority forced the firms to adopt environmentally friendly measures. Through innovative ideas, power sector firms can offer competitive tariffs and thus increasing their market share. By reducing the losses, they can gain a competitive advantage. Prior assessment of environmental legislation helps in better preparedness for the more stringent future environmental norms. The firms are not hesitant in adopting an effective approach to identify future environmental liabilities and the ability to tackle them without cost consideration.

The outcome of the earlier studies are helpful, but they cannot be generalised for countries like India. The study intends to find whether the power sector firms in India who are environmental vanguard are environmentally proactive or not. The study is based on a questionnaire based survey. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) are used to identify the relationship between the variables. Eight hypotheses are proposed and statistically tested using SEM.

2. Research Question

In spite of applicable environmental regulations, some firms are more inclined towards environmental protection. What are the reasons for such environmental proactiveness? Factors are identified through a literature review, questionnaire survey, and experts' opinion. The study intends to test the hypotheses proposed based on factors identified statistically. The study aims to understand whether the power sector firms in India who are environmental vanguard are environmentally proactive or not.

3. Literature Review and Hypotheses Development

3.1 Proactive Environmental Strategies

Various researchers have proposed multiple definitions of proactive environmental strategies (PES). It is an accepted fact that the general level of strategic proactivity of a firm is related to its environmental strategic proactivity [28, 29]. PES are mentioned as strategies which are beyond compliance but are different from over compliance [30]. In the over-compliance, the firms seek to follow government regulation but deliver more than the legal requirement due to technological indivisibilities. Therefore, beyond compliance policies deliberately intend to deliver more than

DOI: https://doi.org/10.30564/jees.v1i2.905

the requirement of existing laws. Several researchers have mentioned environmental strategies which can be classified as PES. "Role of the characteristics of the firm to explain the adoption of 'beyond compliance' strategies" has been looked at by other researchers, including "the influence of organisational context and design" [20, 31, 32, 33] along with "organisational learning" [34]. Focus on the "individual or managerial level," analysing the "role of leadership values" [35], and "managerial attitudes" [32] are mentioned. However, there is still more to be understood about the conditions which explain the PES adoption beyond legal compliance at the plant level [36].

3.2 Research Hypotheses

This paper investigates the factors which are responsible for the adoption of PES by the power sector companies in India. Based on the literature review, the following factors are considered to be primarily responsible for PES adoption:

Innovation

Technological innovation is an essential requirement for sustainable development. After initial 1990s, the initiation of globalisation and start of increased awareness towards sustainable development, industrial environmentalism was accepted as a tactic for improving the environmental effectiveness of the technological systems [37]. According to [38], environmental impact can be explained by the equation:

I = P x A x T

where,

I = environmental impact

P = population

A = affluence (consumption of services and products per capita)

T = technology (environmental burden per product or service unit)

As population and affluence are the social and political issues, technology remains the only alternative to minimise the environmental impact.

From the above discussion, the following hypothesis (H) can be derived:

Hypothesis 1 (H_1): Innovation is positively associated with the adoption of PES.

Environmental stewardship

Environmental stewardship assimilates three largely interconnected sustainability approaches [39, 40, 41]. These approaches are: (i) minimising vulnerability to anticipated changes [40, 42]; (ii) developing flexibility to withstand expected circumstances in the event of unrests and uncertainty [43]; and getting prepared to overcome from adverse situations to take on emerging opportunities [44]. Environmental stewardship involves trade-offs between efficiency and resilience along with near and long-term benefits [3, 45]. According to [46], product stewardship aims to not only minimise pollution during the manufacturing process but also all the adverse environmental impacts during the product life cycle. Based on the above arguments following hypothesis is proposed:

Hypothesis 2 (H_2): Sincere environmental stewardship is positively associated with the adoption of PES.

Defined environmental policy

The regulatory authority offers possible control relief for environmental front runners on various levels. This relief from the regulatory authority was claimed as a possible benefit for firms, and subsequently, it became a practice for firms investing in environmental systems which are compliant to Eco-Management and Audit Scheme (EMAS) and ISO 14000 [47]. It may be an interesting finding for the regulatory bodies after years of experience to know whether if such practices are worthwhile, i.e., firms having a defined environmental policy are performing better than those without defined environmental policy. It is an interesting motive to analyse whether environmental performance is improved by the Environmental Management System (EMS), and enhanced environmental performance becomes a benchmark [48].

The above discussion gives rise to the following hypothesis:

Hypothesis 3 (H_3): Defined environmental policy is positively associated with the adoption of PES.

Effective approach to identify future environmental liabilities

In the 1990s, the firms started adopting proactive environmental management strategies, through which they initiated anticipation of adverse environmental impact of their operations, started measures to reduce pollution and waste prior to regulation, and evolved optimistic approach of taking benefit of business opportunities by adopting total quality environmental management [49]. Many firms integrated values in their corporate cultures and management processes. A "second bottom line" has emerged as auditing and accounting practice for environmental impacts in an increasing number of firms [50]. Even though environmental impacts may not be quantified financially, companies cannot afford to ignore them [51]. Above discussion leads to the following hypothesis:

Hypothesis 4 (H_4): Effective approach to identify future environmental liabilities and the ability to tackle them without cost consideration is positively associated with the adoption of PES.

 DOI: https://doi.org/10.30564/jees.v1i2.905

Product and brand differentiation

Difficulty in the differentiation of products or services based on noticeable quality features can be overcome through the brand image [52]. Considering the increased consumers' environmental consciousness and stringent environmental regulations, the green brand image of the company plays a crucial role. Companies can reflect the low carbon footprint of their product to achieve product differentiation [16, 53, 54]. As a better brand or green image may not only avoid business disruption, environmental protests, and penalties but also helps the firms to increase their customers' satisfaction about environmental concerns. The power sector companies can build a product and brand differentiation by ensuring that the majority of their generation is from the renewable sources of energy, thus minimising emissions. Based on the above discussion following hypothesis is proposed:

Hypothesis 5 (H_5): Product and brand differentiation are positively associated with the adoption of PES.

Prior assessment of future environmental legislation

Prior assessment of environmental legislation helps the companies to take corrective action by reducing waste and pollution, preventing regulatory enforcement [49]. This helps them in getting market benefits as compared to competitors who fail to anticipate future regulations. Expertise available towards "renewable energy technologies, carbon capture and storage and highly efficient fossil fuel power plants" can be a key lever for achieving emission cut target [55]. It is a general belief that pollution prevention pays. The proactive firms (lower polluting) may be adopting more advanced strategies build on low emissions involving other sources of sustainable competitive advantage [56]. The proposed hypothesis is based on the above discussion:

Hypothesis 6 (H_6): Prior assessment of future environmental legislation is positively associated with the adoption of PES.

Customer concern for the environment

Several studies reason why firms act voluntarily to improve their environmental performance beyond the requirement of extant laws. Considering the firm as a rational actor, the economists suggest that firms believe such voluntary action will help them to market their product by influencing the customers, asking high price considering the customer concern for the environment, and creation of a market for products with low carbon footprints [57]. Customers, investors and other stakeholders can influence a firm's behaviour through products and capital markets. Companies may adopt PES through reasonable efforts by improving their environmental performance and addressing the concerns of customers and stakeholders [58]. Above discussion leads to the following hypothesis:

Hypothesis 7 (H_7): Customer concern for the environment is positively associated with the adoption of PES.

Cost saving and liability reduction

[59] identified that implementation of supply chain management practices could result in reduced inventory level, reduced lead time in production, increased flexibility, accurate forecasting, cost saving and accurate resource planning. Whereas, companies who implement green supply chain management practices gain due to cost savings (effective raw material utilisation, reduced energy and water use), improved public image and reduced environmental liability [60]. Poor environmental accomplishment can result in significant ecological damage resulting in monetary cost for the companies. [61] mention companies' pro-environmental behaviour is closely associated with its financial performance. Firms which are sensitive towards the environment can generate the confidence of the regulators and investors. Above discussion leads to the following hypothesis:

Hypothesis 8 (H_8): Cost saving and liability reduction are positively associated with the adoption of PES.

3.3 Hypothesised Model

Figure 1 shows the hypothesised model.

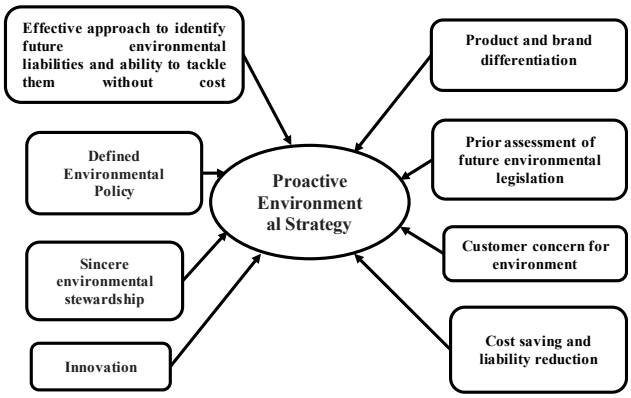

Figure 1. Hypothesised model

4. Research Significance and Objectives

Primarily the study intends to deliver information and evidence based understanding regarding the environmental proactivenss of environmental vanguard firms in the Indian power sector. Although there are many studies available on proactive environmental strategies, however, only a few of them are sector specific. The study attempts to identify the reasons for the environmental proactiveness in Indian power sector firms. The variables selected are beyond the purview of the regulatory authority. The study will help the policymakers of the environmental manage-

DOI: https://doi.org/10.30564/jees.v1i2.905

ment system in recognising the variables considered in the research as factors governing the power sector firms' proactive behaviour towards the environment. The study intends to provide a meaningful understanding for the environmental managers, leaders in the business, policymakers, and environmentalists through evidence-based study for the formulation of potent environmental protection policies.

5. Research Design and Methodology

5.1 Sample and data collection

The study uses primary as well as secondary sources of information. The questionnaire, focus group study and interviews formed the basis of primary data collection. The annual reports published by the companies contributed to the secondary data. Two focus group studies helped in understanding the key dimensions of the study. Two interviews 45-60 minutes duration were conducted. The period of the study was from May-2015 to July-2016. The interviews, literature available along with focus group study helped in designing a questionnaire which was related to work done in similar areas [14, 29, 30].

The study adopts survey method which helps in collecting a large number of responses in a short period. The questionnaire method of data collection offers certain benefits, which are inexpensive and offer quick results. Considering these benefits, both mail and self-administered questionnaires are used as an instrument for data collection. The target population for the study are the power sector firms in India who ensured regular environmental or sustainability reporting. The study followed a modified scale development methodology of [62] used by [63, 64, 65] where EFA and CFA were conducted on the total sample size. For the initial EFA, a total of 90 responses were used to assess initial reliability. For further validation, 190 responses were collected additionally for the analysis. Finally, the EFA and CFA were performed on a total sample size of 280 [65]. The study adopts a non-probabilistic sampling strategy combined with snowball sampling method to select the firms for the study. Snowball sampling involves requesting a respondent to suggest another similar respondent [66].

Out of total 280 level wise respondents, 63 respondents were from the junior level of the management comprising 22.50%, 110 from the middle level comprising 39.28% and 107 from the senior level comprising 38.22%. Department wise out of total 280 respondents, 123 respondents were from the environment department comprising 43.93%, 80 from the maintenance department comprising 28.57%, 62 from the finance department comprising 22.14%, and 15 from the others comprising 5.36%.

5.2 Questionnaire Design

The questionnaire method was preferred because it permits collecting a relatively large sample in a short period. The pilot study validated the pre-tested questionnaire. Based on the pilot study, the final questionnaire was prepared, which included a covering letter mentioning the purpose of the study with anonymity assurance to the respondents. The first part of the questionnaire covered the necessary information of the respondents like name, department, designation, and sector, along with a brief introduction to the research. While the second part consisted of various items capturing the essence of different constructs like innovation, environmental stewardship, defined environmental policy, effective approach to identify future environmental liabilities and ability to tackle them without cost consideration, product and brand differentiation, prior assessment of future environmental legislation, customer concern for environment, and cost saving and liability reduction. The final questionnaire used for the survey consisted of eight items. These eight questions were marked as EVO 1 to EVO 8. All the measurements in the study are subjective assessments by the respondents using a seven-point Likert scale ranging from 1= Strongly Disagree to 7= Strongly Agree.

5.3 Data Analysis

Statistical Package for Social Sciences (SPSS) version 23 is used for the quantitative analysis of data. The coefficient of α, i.e. (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. The coefficient of α determines the statistical significance of survey measures. The value of the coefficient of α ranges from 0 to 1. The measure is considered statistically significant if the Cronbach's α value is closer to 1. This means that items which measure a particular concept are highly correlated with each other. Therefore, the reliability of a measure is confirmed by calculating Cronbach's α. For the current study, the value obtained is 0.949, indicating reliability and validity of the scale. Table 1 shows the reliability analysis.

Table 1. Reliability analysis

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	No. of items
.949	.947	8

DOI: https://doi.org/10.30564/jees.v1i2.905

Suitability of data for factor analysis is measured by the Kaiser-Meyer-Olkin (KMO) Test. The sampling adequacy for individual variable and the complete model is measured by this test. KMO must be > 0.60 for good factor analysis [67]. All analysis for the present study was done at a 95% confidence interval. The KMO value obtained is 0.920 at a significance level of 0.000, which indicates the suitability of data for factor analysis.

Table 2 represents the outcome of KMO analysis.

Table 2. KMO Analysis

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.920
Bartlett's Test of Sphericity	Approx. Chi-Square	2474.998
	df	28
	Sig.	.000

Latent variables identification through factor analysis contributes to a common variance in a measured variables set. Two factors emerge having Eigen value >1. These two factors represent the variance of 87% out of the total variance. Table 3 represents the variance of items. Extracted and rotated sum of squared loadings are also shown in the table.

Table 3. Total variance explained (Extraction method: Principal Component Analysis)

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	5.920	74.002	74.002	5.920	74.002	74.002	4.827	60.342	60.342
2	1.058	13.224	87.225	1.058	13.224	87.225	2.151	26.883	87.225
3	.245	3.057	90.283						
4	.198	2.477	92.760						
5	.181	2.259	95.019						
6	.156	1.951	96.970						
7	.128	1.595	98.565						
8	.115	1.435	100.000						

Descriptive analysis showing minimum, maximum, mean, standard deviation and variance is shown in Table 4.

Table 4. Descriptive Statistics

	N	Range	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
EVO1	280	6	1	7	4.29	.123	2.065	4.264
EVO2	280	6	1	7	4.24	.112	1.870	3.496
EVO3	280	6	1	7	4.58	.118	1.968	3.872
EVO4	280	6	1	7	4.37	.121	2.019	4.076
EVO5	280	6	1	7	4.20	.110	1.842	3.391
EVO6	280	6	1	7	4.20	.107	1.785	3.186
EVO7	280	6	1	7	4.96	.104	1.733	3.002
EVO8	280	6	1	7	5.06	.097	1.622	2.631
Valid N (list wise)	280							

Table 5 shows the factor loadings, % variance explained and Eigen value of the two factors.

Table 5. Factor Loadings

Factor	Description of Variable	Factor Loadings	% Variance Explained	Eigen Value
EVO4	Effective approach to identify future environmental liabilities and the ability to tackle them without cost consideration	.922	60%	5.920
EVO5	Product and brand differentiation	.898		
EVO2	Building firms reputation through sincere environmental stewardship	.883		
EVO1	Innovation	.875		
EVO6	Prior assessment of future environmental legislation	.868		
EVO3	Proactive corporate policy	.834		
EVO8	Cost saving and liability reduction	.932	27%	1.058
EVO7	Customer concern for environment	.867		

After establishing the proposed measurement, the model hypotheses are tested using Structural Equation Modelling (SEM) technique [68] using the maximum likelihood method. 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 [68], the stability of measured items is confirmed by examining loading estimates. The parameters are considered stable when the loadings do not show any substantial change. This is also known as a measurement model validity. In the case of the present study, the chi-square statistics are estimated for checking 'p' value for overall model fit.

6. Results

The earlier section explains the results of reliability statistics, KMO and Bartlett's test, total variance and factor analysis. The following part explains the results of CFA and SEM.

Figure 2 shows the hypothesised confirmatory factor analysis model.

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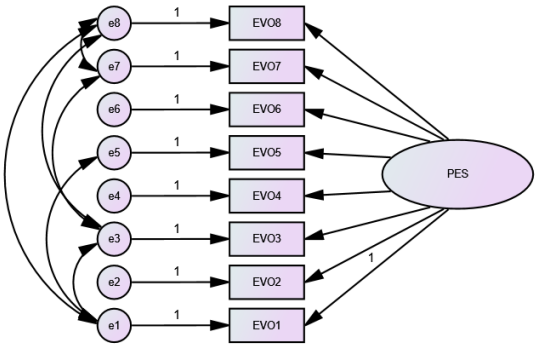

Figure 2. Hypothesised confirmatory factor analysis

Figure 3 represents the standardised estimate output path diagram for the hypothesised confirmatory factor analysis model.

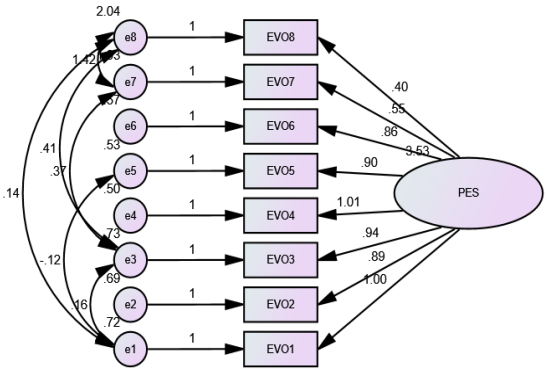

Figure 3. Standardised estimate output path diagram for the hypothesised confirmatory factor analysis model

The results of the CFA analysis are shown in Table 6.

Table 6. Regression weights

			Estimate	S.E.	C.R.	P
EVO1	←	PES	1.000			
EVO2	←	PES	.890	.037	24.149	***
EVO3	←	PES	.941	.034	27.710	***
EVO4	←	PES	1.005	.037	27.465	***
EVO5	←	PES	.899	.038	23.920	***
EVO6	←	PES	.858	.035	24.830	***
EVO7	←	PES	.548	.048	11.510	***
EVO8	←	PES	.404	.047	8.676	***

p value *** indicates that significance is smaller than 0.001 which signifies that the regression weights are different from zero and hence we conclude that that hypothesised relationship is significant. Similarly, significance of estimated covariance among the latent variables, as shown in Table 7 is assessed, if critical ratio C.R. > 1.96, the factor covariance is significant. The values of C.R. for the analysis are > 1.96 for all indicators; hence, the factor covariance is significant.

Table 7. Variances

	Estimate	S.E.	C.R.	P
PES	3.527	.358	9.859	***
e1	.715	.080	8.976	***
e2	.689	.067	10.217	***
e3	.733	.074	9.963	***
e4	.496	.056	8.881	***
e5	.528	.057	9.235	***
e6	.575	.057	10.025	***
e7	1.931	.167	11.587	***
e8	2.038	.173	11.807	***

Cmin/df < 3 indicates an acceptable fit between the hypothetical model and sample data. According to the model fit summary, as shown in Table 8, the value of Cmin/df is 1.653, which is acceptable.

Table 8. Model fit summary

CMIN (Chi Square Value)	**NPAR**	**CMIN**	**DF**	**P**	**CMIN/DF**
	22	**23.135**	**14**	**.058**	**1.653**
Baseline Comparisons	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
	.991	.982	.996	.993	.996
RMR (Root Mean Squate Residual)	RMR	GFI	AGFI	PGFI	
	.049	.980	.949	.381	
RMSEA (Root Mean Square Error of Approximation)	RMSEA	LO 90	HI 90	PCLOSE	
	.048	.000	.082	.489	

Comparative Fit Index (CFI) evaluates the superiority of the tested model over the alternative model with manifest covariance matrix [69]. The CFI value for the current study is 0.996 and is acceptable. "Normed Fit Index" (NFI), the proportion in the improvement of the overall fit of the hypothesised model compared to the independent model, theoretically ranges from 0 (poor fit) to 1 (perfect fit), considered satisfactory when > .90. For the study, NFI is 0.991 and is highly acceptable.

Similarly, Goodness of Fit Index (GFI) theoretically ranges from 0 to 1, considered satisfactory when > .90. The GFI obtained for the study is 0.980, which is ideal. "Adjusted Goodness of Fit Index" (AGFI), like GFI but adjusts for model complexity (like adjusted multiple r-squared), is considered satisfactory when > .90. AGFI for the study is 0.949 and is therefore acceptable. "Root Mean Square Error of Approximation" (RMSEA), calculates the size of the standardised residual correlations, considered acceptable when < .05. Value of RMSEA obtained is 0.048. From the model fit summary represented in Table 8, it is concluded that the hypothesised model is supported statistically. The results of the hypotheses are

 DOI: https://doi.org/10.30564/jees.v1i2.905

mentioned in Table 9.

Table 9. Hypotheses testing

No.	Hypothesis	Significance	Accepted
H1	Innovation is positively associated with the adoption of PES	***	Yes
H2	Sincere environmental stewardship is positively associated with the adoption of PES	***	Yes
H3	Defined environmental policy is positively associated with the adoption of PES	***	Yes
H4	Effective approach to identify environmental liabilities and the ability to tackle them without cost consideration is positively associated with the adoption of PES	***	Yes
H5	Product and brand differentiation is positively associated with the adoption of PES	***	Yes
H6	Prior assessment of future environmental legislation is positively associated with the adoption of PES	***	Yes
H7	Customer concern for the environment is positively associated with the adoption of PES	***	Yes
H8	Cost saving and liability reduction is positively associated with the adoption of PES	***	Yes

Note: *** highly significant at $p < 0.001$

7. Conclusion

7.1 Discussion of Results

The Indian power sector has witnessed a dynamic change since the 1950s from the coal-based highly polluting power plants to the ultra-modern super thermal power plants. Due to the absence of basic infrastructure in the early 1950s, the primary focus was to establish the power plants with the technology which was available during that period. With the rapid growth in industrialisation, demand for power increased manifold, which resulted in consumption of widely available coal and greater emissions. With the increase in awareness towards increasing adverse effects of emissions on the ecology, the environmentalists pressurised the governments to evolve policies for controlling the environmental damage. The Indian power sector, which was a state monopoly witnessed the entry of private firms which were equipped with better technologies and were more transparent in environmental reporting. However, inspite of regulatory norms for environmental protection, several firms were observed to be more conscious of environmental damage. Normally for a business entity bare minimum compliance of regulatory norms is observed. So, what prompted these firms to go beyond the extant laws to adopt proactive environmental strategies? The study was conducted to identify the factors based on the literature review and annual reports of the firms who were proactive towards environmental protection. Based on the questionnaire, 280 valid responses were received. SEM supported all the proposed eight hypotheses.

According to hypothesis H_1, innovation is considered to be positively associated with PES adoption. The analyses support the hypothesis. According to [37], technological innovations are considered as key requirements for sustainable development. Hypothesis H_2 proposed environmental stewardship as a positive indicator of PES adoption. As reported in several studies [45, 70], environmental stewardship involves trade-offs between efficiency and resilience along with near and long-term benefits. Thus environmental stewardship benefitted the firms adopting PES. A defined environmental policy is always better to deal with any adverse condition arising due to environmental damage. The firms having a defined environmental policy were able to get relief from the regulatory authorities which benefitted the firms investing in environmental systems [47]. Thus, the analyses rightly support the hypothesis H_3, which proposes defined environmental policy as a positive indicator of environmental proactivity. To protect their business interests, the firms in the emission intensive area must adopt an effective approach to identify future environmental liabilities as any change in regulation may severely affect its business. [49] studied the initiatives taken by the firms' in the early 1990s to anticipate the adverse environmental impact of their operations and measures taken for reducing pollution and waste before regulation. This resulted in an optimistic approach to taking benefit of business opportunities by adopting total quality environmental management. The analyses rightly support hypothesis H_4, which proposes an effective approach to identify future environmental liabilities as a positive indicator of firms' environmental proactiveness. For any firm to have a positive image in the market, it creates a product and brand differentiation. With increased consumer awareness and stringent environmental regulations, the green brand image of the firm helps in a smooth business transaction [16, 53, 54]. Thus the analyses rightly support the hypothesis H_5 mentioning the product and brand differentiation as a key indicator. Anticipating any change in environmental legislation in advance helps the companies to prepare for the same through waste and pollution reduction, averting any regulatory enforcement [49]. Such preparedness helps in gaining an advantage over the competitors who are not prepared to act in advance. Availability of expertise regarding "renewable energy technologies, carbon capture and storage and highly efficient fossil fuel power plants" can be vital for accomplishing emission cut target [55]. The analyses rightly support the hypothesis H_6 mentioning prior assessment of future environmental legislation as a positive indicator of PES adoption. Considering the

DOI: https://doi.org/10.30564/jees.v1i2.905

hypothesis H_7 proposing customer concern for the environment to have a positive association with PES adoption, it is recommended by the economists that firms can influence their customers by taking voluntary action for environmental protection and creating a market for products having low carbon footprints [57]. The study finds the association positive in H_7. Finally, according to hypothesis H_8, cost saving and liability reduction are positively associated with the adoption of PES. The analyses find a positive association and support the hypothesis. According to [59], a company can achieve reduced inventory level, lead time reduction, flexibility improvement, cost saving and effective resource planning by implementing supply chain management practices. Companies preferring green supply chain management can cut costs through effective use of raw material, reduced water and energy use, enhancing the public image, and reduced environmental liability [60]. These studies support the analyses outcome, which supports the hypothesis H_8.

7.2 Limitations and Scope for the Future Study

Even though the results reflect that the environment vanguard firms in the Indian power sector are more environmentally proactive than their counterparts, there are limitations to the study. The industry specific and country specific limitations point to investigate whether other industries and countries have the same outcome. Not all industries may have the same level of vertical integration across the environmental policies, nor might there be visible environment implications from their operations. Thus, these industry differences need to be investigated. Another limitation of the study is whether the small companies in the power sector show similar behaviour as compared to their multinational counterparts. Such a study can throw light on the outcome of the adoption of PES by small and big companies in the power sector.

Although the findings of the empirical study are meaningful, the empirical research on sector specific study in India is limited. This empirical research focuses only on explaining the adoption of PES by the power sector in India. The other key sectors, which are also contributors to infrastructure development, need to be investigated. Very limited work is available on sector specific studies, and more studies are required. Further, a specific study on noncompliance with environmental regulations will also throw light on the issue. Another important study can examine the effect of regulatory capacity and its ability to enforce regulations along with institutional regulatory structure with its implications on environmental strategies of the firms.

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