

Managers' Environmental Altruism and Firms' Compliance to National Environmental Management Strategies: Evidence from the Food Processing Sector in Sri Lanka

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ABSTRACT

The environmental economics literature highlights that incentive-based policies (e.g. taxes, tradable permits) are more efficient than command-and-control type regulations that require each firm to adopt the same abatement technology and that the adoption of such controls in the firm is not only driven by organizational-level determinants but are also the outcomes of environmental paradigms of the management or rather its environmental altruism. Hence, this study was aimed to examine the degree of influence their altruistic behavior possess in complying to the environmental management controls, using the special case of "non-adopters" of the "National Strategy for Solid Waste Management" recently introduced by the Ministry of Environment, under which, a set of environmental management controls with the characteristics of technology standards are recommended for the Sri Lankan food processing industry to minimize the accumulation of solid waste in the firm and reduce industrial pollution as a whole. The firms involved with processing of different types of food products at various scales in the most densely populated provinces in Sri Lanka, but did not comply with any of the environmental controls recommended by the ministry by May 2010 (n=150) were selected for the study. Data were collected through personal interviews with the person responsible for implementing environmental controls of the firm, supported by a structured questionnaire comprised of a set of attitudinal statements which encapsulates the degree of environmental altruism of the respondent. The scores given to each statement by the firms on a two-way five-point Likert scale were subjected to a series of Multivariate Data Analysis techniques (e.g. Principle Component Analysis, Scale Reliability testing), and the outcome of which was used to derive an *Environmental Altruistic Index (EAI)* and a *Weighted Environmental Altruism Index (WEAI)* – an additive index of which the values range from -1.00 (perfectly non-altruistic) to 1.00 (perfectly altruistic).

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The results suggest that the values of EAI were relatively low i.e. 0.25, on an average, of the WEAI ranges from -1 to 1. This implies that, amongst the other internal (e.g. cost, efficiency) and external (e.g. commercial pressure, liability) forces and coercive government pressure, it is equally important to augment the environmental altruism of decision-makers through better education and awareness programs alongside an incentive-based regulatory framework to increase the level of adoption of environmental controls at the firm level.

KEYWORDS: Agri-food processing sector, Altruism, Environmental controls, Waste management

INTRODUCTION

The literature on environmental economics and management points out two broad ways to maintain environmental quality: (1) the legal framework provided by the government and judiciary [public], and (2) the voluntary environmental protection, which is to be undertaken by the firm on its own willingness [private] (Hettige *et al.*, 1996). A large number of conceptual frameworks developed (see, for example Kolstad *et al.*, 1990; Rugman and Verbeke, 1998; Segerson and Miceli, 1998; Viscusi, 1989; Weersink *et al.*, 1998) and empirical analysis carried out (Henriques and Sadorsky, 1996; Khanna, 2001; Nakamura *et al.*, 2001) in the context of both the developed and developing countries to discuss about the effect of the actions of both public and private institutions work in these respect in the recent time. We may have judged that the outcomes of many of these studies generally place too much emphasis on the shortcomings of the market to address the issues related to environment, and at the same time, have tended to over-estimate the advantages that come from government regulation.

The effect of government regulatory framework and the market forces for a firm operates in a given business environment, especially for a food processing firm that is subjected to a relatively high consumer concerns and sensitivity towards food and environmental quality related issues is more or less the same at a given point of time (Segerson, 1999; 1986). However, there exist significant differences with regard to private action by individual firms on environmental quality or the interplant variations in responses towards the adoption of enhanced environmental management controls at the firm level.

Social scientists, economists and psychologists in particular, insist that this may mainly be associated with the degree of "altruism" of decision makers of the firm, but failed to date to elaborate this phenomenon to a depth. Altruism is defined, broadly, as the unselfish concerns for the welfare of others, or in other words, as an action that increases the welfare of others without regard for one's self interest. This shows that altruism is likely to play a particularly important role in people's attitudes and behaviour when the issue of concern is a matter of collective interest, and environmental issues can be considered as prime examples in this domain. Altruistic behavior of a firm can have a crucial impact on its private action towards maintenance of the quality of its products and on the environment. Environmental altruism is, thus, defined as making decisions and taking actions by the management of a firm with respect to environment that will ultimately augment the environment quality and its status (Kolm and Ythier, 2006).

Understanding the motives for corporate environmental responsiveness is critical for two reasons. First, so would assist to predict environment based behaviors of firm's decision makers. Second, that can expose the mechanisms that foster environmentally sustainable firms' managers to determine the relative efficacy of command and control mechanisms, market measures, and

voluntary measures (Henriques and Sadosky, 1999). Several studies have identified motives for corporate "greening," such as regulatory compliance, competitive advantage, stakeholder pressures, ethical concerns, critical events, and top management initiative. Bansal and Roth (2003) identified four drivers of corporate environmental response, including: (1) regulation; (2) stakeholder pressures; (3) economic opportunities, and (4) ethical motives or altruism. The prior research suggests that firms may be ecologically responsive to comply with legislation, to build better stakeholder relationships, to acquire economic wealth and competitive advantage, and to maintain ecological balance. Certain literary framework draws on costly signaling theory and on research on competitive altruism which posits that conspicuous displays of altruism can function to build and maintain costly pro-social reputations.

Environmental responsiveness, in this context, is not only driven by organizational-level determinants and regulations but also by they may be the outcomes of managers' environmental paradigms or belief systems. Thus, it is consistent with many theories that emphasized that the adoption environmental controls/technological standards due to command and control such as escalating penalties, fines, are more successful in the firms where the managers are more techno-centric while ethically motivated and eco-centric managers are self regulated and respond due to their altruistic behavior.

This economic problem has, nevertheless, not been explored empirically to date, especially in the developing country context. Under these circumstances, it is of paramount importance to examine extent to which the environmental altruism of the management of a firm has an impact on management of environmental quality as that knowledge can be used extensively to formulate appropriate end-user friendly environmental policies or to strengthen the

existing regulatory frameworks by minimizing their vagueness. For the purpose of this study, we use the special case of adoption of enhanced environmental controls, which was formulated by the Ministry of Environment (and Natural Resources then) [MENR], by the firms operate in the agri-food processing sector in Sri Lanka.

Being the largest manufacturing sector in Sri Lanka with more than 80 percent of firms operate in the provinces of very high population density, for example more than 500 people per km², the generation and unhygienic accumulation of waste through these agri-food processing firms has become a growing problem in Sri Lanka. As a solution to this problem, the MENR has already formulated the “*National Strategy for Solid Waste Management*” which under which, a set of environmental management controls with the characteristics of technology standards are recommended for the Sri Lankan food processing industry to minimize the accumulation of solid waste in the firm and reduce industrial pollution as a whole (1) “*Sorting of waste based on 3R System*” – establishment of necessary infrastructure facilities in appropriate places and allocating labor for the purpose; (2) “*Composting*” – the conversion of solid waste materials into composts, in which the heavy metal composition should be maintained below the recommended standards; (3) “*Biogas technology*” – establishing units in accordance with the guidelines provided by the MENR; (4) “*Biodegradable packaging materials*” – using material such as paper, glass, cloth, etc. instead of polyethylene and other non-biodegradable plastics; (5) “*Sanitary land filling*” – the maintenance of a site for which the firm should obtain clearance based on the guidelines provided by the Central Environmental Authority (CEA) in Sri Lanka; (6) a set of “*Good Manufacturing Practices*” (GMP); (7) Regular “*Waste Auditing*” system; and (8) *ISO 14000 Environmental Management System*. An individual business can select either one or a combination of these

practices or any other appropriate mechanism that they deem to be effective in rectifying the problems associated with the generation of waste in their premises.

The specific objective of this study was, therefore, to examine empirically the potential relationship between the degree of environmental altruism and the level of adoption of those solid waste management practices (SWMPs) by the firms operate in the agri-food processing sector in Sri Lanka and to assess how firms’ altruistic behavior varies according to the type and the scale of operation. In turn, we hypothesize that a firm’s response to environmental quality, which is reflected by the number of SWMPs adopted by a firm, has a positive relationship with the degree of environmental altruism of decision maker of the firm and the characteristics of the firm (i.e. type and size of the firm).

METHODOLOGY

Derivation of Index to Reflect Environmental Altruism

The first step towards empirical analysis was to assess the degree of environmental altruism of firm’s decision maker on environmental quality. Altruism is, however, a behavioral concept that is directly unobservable, and in consequently, an analysis on quantifying its effect on a phenomenon such as environmental quality management is needed to be constructed as an indirect measurement that has an ability to approximate the true behavior of environmental altruism at the level of firm. By taking into considerations the facts explored in Jayasinghe-Mudalige and Henson (2006), we have resolved to derive an index for this purpose, which reflects the degree of altruism of the firm’s decision maker on environmental quality. To derive this particular index – herein referred to as “*Environmental Altruism Index*” (EAI), a series of attitudinal statements (n=12) were specified to reflect diverse facets of environmental altruism cited in literature (Table 1).

Table 1: Attitudinal Statements reflecting altruism

Attitudinal Statement	
U ₁	Many top managers in my firm are personally and actively involved in developing environment protection policies and monitoring their implementation.
U ₂	My Company has a written environmental policy that states goals for improving our environmental performances.
U ₃	Clear and strong signal has been sent from our top managers that better environmental management is a requirement in our firm, not a choice.
U ₄	My firm has a long term plan to lower our pollution control costs in order to be more competitive in the market.
U ₅	Environmental protection is an integral part of my company's culture.
U ₆	Ideas on pollution management are shared freely among lower, middle, and upper levels within my firm.
U ₇	Humans have the right to modify the natural environment to suit their needs.
U ₈	Advances in technology will eventually solve the problem of environmental degradation.
U ₉	My firm's contribution to environmental pollution is small and hardly makes a difference.
U ₁₀	Polluters should pay fully for the damage they cause, and be responsible for cleaning up their pollution.
U ₁₁	A certain amount of environmental damage is tolerated if there is to be economic growth.
U ₁₂	I feel it is my personal responsibility to ensure that my organization improves its environmental performance.

Following the good practices of developing attitudinal statements to obtain objective responses from respondents by preventing response bias (Henson and Traill, 2000), the meaning of some of the statements were set purposely to reflect “techno-centrism” of a respondent. A multi-point likert-scale of which the points range from -5 from one end to +5 on the other (i.e. -5 to 0 if the respondent “disagree” with the underline phenomenon of the statement and 0 to 5 if “agree” to it) was constructed to obtain scores for each statement.

Having formulated the set of statements, we need to make sure whether all statements were condensed into a single factor by eliminating the empirical issues associated with quantifying attitudes and perceptions of people, including the endogeneity, mutual exclusivity, subjectivity and unobservability through the testing for their unidimensionality (Buchanan, 1969; Hair *et al.*, 2006; Nakamura *et al.*, 2001). The Principal Component Analysis (PCA), which is an interdependence technique stated under the

Multivariate Data Analysis techniques that is used commonly to define the underlying structure among a set of variables of an analysis objectively, was employed to test this condition (Hair *et al.*, 2006). The PCA technique helps particularly to find a way to condense the information contained in these 12 statements (i.e. original variables) into “single variate (factor)” or if not into a “smaller set of new composite dimensions or variates” with a minimum loss of information by taking into account of the total variance amongst the original variables (De Vellis, 1991).

In principle, the EAI was specified to meet the characteristics of an Additive Index (Powers and Xie, 1999) in the form of equation (1) below:

$$EAI_i = \sum_{s=1}^n [a(U_s)]_i$$

The term $a(U_s)_i$ in equation (1) denotes the score given by a respondent (i) to a statement (U_s) [s = number of statements] on the likert-scale. To derive EAI for a given firm, the summation of scores of all the statements ($s=12$) was

divided by the Maximum Potential Score [a (U_s)] to normalize the value of the index. For this particular analysis, the value of [a (U_s)] was 60 (i.e. maximum score of +5 on the likert-scale x 12 statements]. With the normalization, the values of EAI for a given firm, thus, ranges from -1 to 1, where -1 reflects the “perfect non-altruism” (techno centrism) of the decision maker on environment quality, and 1 on the other extreme reflects the “perfect altruism” (eco centrism).

Extent to which a manager perceives the effect of each attitudinal statement on her decision to adopt SWMPs in the firm was of interest in the empirical analysis. Logically, even under the circumstances where the 12 attitudinal statements stated originally were confined to a single variate (i.e. unidimensionality), all the respondents in the sample may not value the underline phenomenon explained in a given statement as equally important, for them to be altruistic towards the environment. If so, it is imperative to incorporate this variation into the analysis. To fulfill this condition the original EAI was extended to a “weighted” EAI – herein referred to as WEAI, as expressed in equation (2) below:

$$WEAI_i = \sum_{i=1}^n W_s [a(U_s)]_i$$

where, all parameters are equal to those given in the EIA equation expressed earlier and W represents the weight assigned to each statement to characterize the variation of responses of respondents.

Given that the condition of unidimensionality was satisfied in this study (see below), the following method was employed to derive the weights. First, the Summation of Scores (SS_a) provided by all respondents in the sample to a given statement was taken and the weight to be assigned to each statement was decided upon the size of SS_a accordingly. As a result, a relatively large weight was assigned to any statement that obtained a large SS_a (see, Table 3). Inclusion of weights into the EAI, thus, helps to identify the statements reflecting altruism

that the respondents “most valued” in terms of their private action on environmental quality, and in turn, to assign them with high weights, which is not the condition for unweighted index (EAI) as it assigns equal weights to all statements.

Study Area and the Data

The food processing firms belonging to five sub-sectors based on the type of product, including: (a) processed fruits and vegetables (PFV)]; (b) coconut products (COP); (c) essential oils (ESO); (d) non-alcoholic beverages (NAB), and (e) other processed products (OPP), located in four provinces [i.e., Western (WP), North Western (NW), Central (CP) and Southern (SP)] were taken for the collection of data. A sample consists of 325 firms, which was selected randomly from a mailing lists of food processors that operate at various locations by contacting reputed institutions such as the Department of Census & Statistics of Sri Lanka, the main and regional offices of the Export Development Board of Sri Lanka, the Federation and Regional Chambers of Industry and Commerce, Coconut Research Institute of Sri Lanka, Fruit and Vegetable Processors Association of Sri Lanka, and Sri Lanka Standards Institution, etc. Out of which 150 firms that have not adopted even a single practice were selected. Further, the firms were classified into two groups to reflect its size by taking into account of its value of annual sales, namely: (a) “Small” (<Rs. 500,000), and (b) “Large” (>Rs. 500,000).

A face-to-face interview supported by the structured questionnaire was conducted with the top-most executive who possess executive powers to make decisions with respect to environmental quality related aspects of the firm (in certain cases, especially in the small firms, it was the owner) to collect data from April to September 2009 followed by an inspection of the site for the cases where permission was granted.

With regard to the statements explaining altruism, each respondent was

asked, in particular, first to rate his/her perception on each statement in relation to the current performance of his/her firm on a two-point Likert scale, i.e., (1) agree (“yes”), or (2) disagree (“no”). Afterwards, he/she was instructed to rate the same statement on a five-point Likert-scale by taking into account of the extent to which he/she agrees (if they say “yes” in the 1st rating) or disagrees (if they say “no” in the 1st rating) with this particular statement (Oppenheim, 1992).

Having coded the data appropriately and performed the standard tests for the missing data in certain cases, the “Statistical Package for Social Sciences” (SPSS) [Version 13] was used to obtain the results of the PCA and the STATA [Version 8].

RESULTS AND DISCUSSION

Descriptive Statistics of the Sample

The 150 firms in the sample comprised of 19 (13%), 44 (29%), 23 (15%), 41 (27%) and 23 (15%) of COP, ESO, NAB, OPP and PFV firms, respectively, with regard to the type of the firm and 98 (65%) and 52 (35%) of Small and Large firms, respectively, in terms of the size of the firm.

Mean Value of the Attitudinal Statements

To evaluate the extent to which the decision maker of the firm perceived the effect of individual statements explaining environmental altruism, the Mean of the scores provided by respondents on each statement on the likert scale was calculated for the sub samples representing both firm type (5 categories) and firm size (2 categories). The values reported in Table 2 highlights that these values varied substantially within these sub samples.

With regard to the Mean values of individual statements, the results show that

the values of which were relatively low and negative irrespective of the type and size of the firm for almost all attitudinal statements. However, with regard to the phenomenon expressed by the statements U4, U11, and U12 listed in Table 1, the managers show a sense of positive altruistic behavior (Table 2). Mean values of the majority of statements were highest in the NAB category implying that managers of these firms are more altruistic than most others in the food industry. The large scale firms possess the highest mean scores for all the statements implying that in spite of non-compliance the large firms tend show positive altruistic behavior compared to the smaller firms. This is further reflected by the mean response of the firms (Figure 1).

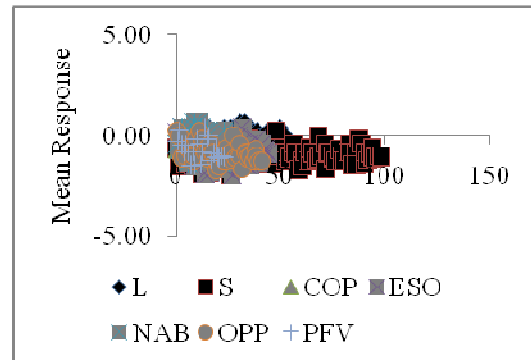


Figure 1: Variation of EAI and WEAI of the zero-adopters of SWMPs (n=150)

Outcome of the Component Factor Analysis

While there is no rigorous criterion specified to assess when factor loadings are significant, Spector (1992) suggests that a minimum value of around 0.30 – 0.35 indicates that an Indicator loads onto a factor, thus unidimensionality condition is satisfied. The outcome of PCA clearly shows that all the statements used to assess environmental altruism in this analysis were condensed into a one factor (Table 3).

Table 2: Mean values of the attitudinal statements

AS	Firm Type					Firm Size	
	COP	ESO	NAB	OPP	PFV	SML	LRG
U ₁	-1.00	-1.93	-1.47	-2.24	-1.65	-2.17	-1.05
U ₂	-2.68	-2.25	-1.17	-2.00	-1.61	-2.19	-1.55
U ₃	0.78	-1.18	-0.30	-1.17	-0.95	-1.32	0.31
U ₄	1.10	0.38	0.47	0.14	0.61	0.16	1.02
U ₅	-0.57	-0.54	-0.56	-0.95	-0.73	-0.88	-0.32
U ₆	-0.89	-1.34	-0.17	-0.56	-0.30	-1.07	-0.09
U ₇	-1.84	-2.18	-2.04	-2.02	-1.34	-2.22	-1.42
U ₈	-0.68	-0.50	0.86	-0.92	-0.82	-0.67	-0.11
U ₉	-3.00	-3.75	-2.86	-4.02	-3.82	-4.22	-2.44
U ₁₀	-2.68	-2.36	-1.65	-1.92	-2.34	-2.31	-1.90
U ₁₁	2.78	2.61	2.91	2.90	2.52	2.70	2.82
U ₁₂	1.84	2.13	2.43	2.07	1.95	1.94	2.38

Table 3: Rotated factor loading matrix

AS	Varimax-Rotated Factor Loadings					COM
	1	2	3	4	5	
U ₁	0.611	-0.021	0.054	-0.049	0.058	0.381
U ₂	-0.01	0.776	0.092	0.144	-0.107	0.642
U ₃	0.643	0.103	0.038	-0.332	0.077	0.541
U ₄	0.614	-0.065	-0.036	0.3	-0.258	0.539
U ₅	0.249	0.452	-0.291	-0.218	0.325	0.504
U ₆	0.149	0.48	0.157	-0.49	0.059	0.520
U ₇	0.084	0.13	0.001	0.834	0.129	0.736
U ₈	0.049	0.218	0.631	0.035	-0.015	0.449
U ₉	0.692	0.212	0.26	0.172	0.082	0.627
U ₁₀	0.026	0.257	0.243	0.181	0.666	0.601
U ₁₁	-0.001	-0.268	-0.167	-0.027	0.719	0.618
U ₁₂	0.169	-0.134	0.781	-0.124	0.025	0.672

Variables are sorted by its factor loading

Note: COM – Communalities

Derivation of EAI and WEAI

The values of both unweighted and weighted index, EAI and WEAI respectively, were obtained for each and every firm in the sample and Mean of EAI and WEAI are illustrated in Figure 2 for sub samples representing the firm types and the firm size.

The results highlight that degree of environmental altruism is comparatively low as the values of both EAI and WEAI are below 0.2 when food processing firms taken as a whole. However, we can infer that the degree of environmental altruism of managers has a positive correlation with

firm size, because Mean EAI and WEAI of the large firms is positive and greater than any other sub sample and that of small firms is negative suggesting that the larger firms possess a higher tenacity to adopt SWMPs in compared to their counterpart. However, the type of firm does not show any significant difference with regard to the degree of environmental altruism. The non-alcoholic beverage (NAB) processing firms possess the highest positive value for both EAI and WEAI followed by those fruits and vegetables (PFV) and coconut product (COP) processing firms, while the mean values of other two types of firms (i.e. ESO and OPP) were negative

indicating that the management of those firms, on an average, did not show altruistic behavior towards the environmental quality. This phenomenon is further proved by the fact that majority of these firms, irrespective of the plant characteristics, did not have any plans to adopt even the four most economical solid waste management practices. Thus it is evident that there is a need to address the gap between the desire and the actual behavior with respect to environmental quality.

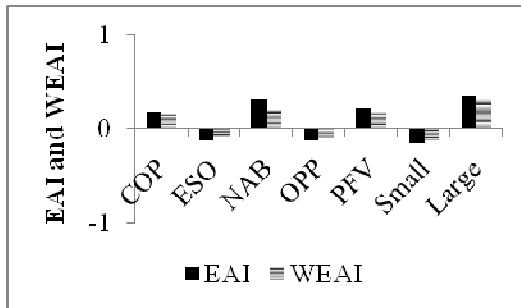


Figure 2: Mean values of EAI and WEAI for different sub samples

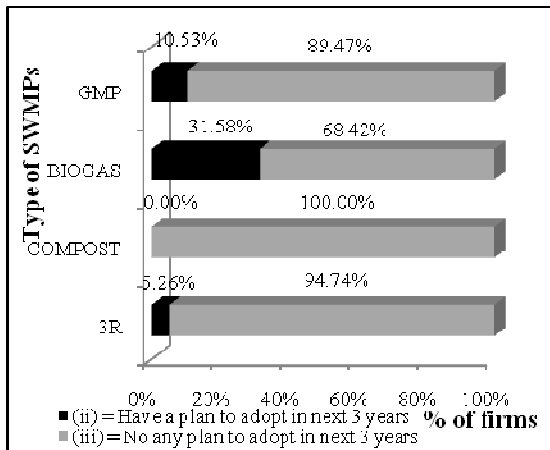


Figure 3: Rate of adoption of SWMPs in the future

CONCLUSIONS AND POLICY IMPLICATIONS

The outcome of analysis proves that the low levels of environmental responsiveness of agri-food processing firms, which is reflected by the small number of SWMPs adopted by the firms, is

associated with relatively low degree of environmental altruism of decision maker of the firm. Therefore, it could be assumed that the perceptions of managers who make decisions with regard to environmental quality in this particular sector may be triggered by the perspectives of diminish profit and/or increased costs and other financial implications associated with the adoption of such controls rather than their unselfish thoughts on the private and social benefits of it in the long run.

The results, overall, suggest that the lack of formalized environmental structures and/or empowerment in the firm appear to have established a context of moral frustration for environmentally interested managers who may feel obliged to suppress their altruistic behavior and prioritize economic interest of the firm. Or it could also be due to the fact that external institutional pressure to adopt these environmental management controls in the developing country context has submerged the altruistic behavior of the managers. We may infer that firms' voluntary action on responding to the market-based incentives such as reputation, minimizing commercial pressure and increasing efficiency in technology and human resources may also not become a reality as the decision makers lack propensity to act voluntarily on such action.

The data suggests that managers' personal values and organizational competitiveness can only explain environmental management practices with more visible financial returns. The need to strengthen ethical support for environmental management in these firms is, thus, a key. Policies and educational programs that foster the capability of firms to use non-financial criteria as an element of their decision-making process may provide a contribution. This study illustrates how coercive pressures through legislation are currently not relevant and reflects fairly good intentions, at least at the individual level of managers, regarding future development of environmental sustainability. In its process to respond to the current regulation on environment, a

firm has several roles to play and out of which augmentation of environmental altruism of managers is not second to any. The results suggest that it is the lack of appropriate frameworks that stands between good intentions and actual behavior clearly an area deserving further research attention. The novelty of the concept and the lack of knowledge, particularly in domestic firms, may make managers unaware of the potential benefits from environmental responsiveness. This implies that, amongst the other internal (e.g. cost, efficiency) and external (e.g. commercial pressure, liability) forces and coercive government pressure, it is equally important to augment the environmental altruism of decision-makers through better education and awareness programs alongside an incentive-based regulatory framework to increase the level of adoption of environmental controls at the firm level. Thus, the government, together with the other sectors in the market (such as industry and trade organizations) should assist the firms to develop appropriate environmental quality management programs coupled with extensive training to enhanced their awareness on the environment. Trade and other industry organizations, as an integral part of the market can play an extensive role in this connection to make use of a firm's resource base most effectively in this respect, and for that purpose, it is needed to reward the self-motivated managers regularly for their altruistic behavior on environmental quality.

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