



Pollution prevention strategy: a study of Indian firms



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ABSTRACT

Strategy that targets pollution prevention shall be the first one among sustainability strategies to be implemented to achieve early cost advantages and mitigate litigation risk. This article aims to isolate pollution prevention strategy (PPS) from other similar sustainability strategies and provides an independent scope of PPS. A questionnaire based survey was conducted among 689 managers of 60 Indian firms known for their orientation towards sustainability. Factorial analysis delivered five factors highlighting the composition of associated variables. Descriptive statistics was used to understand the relative importance of various aspects of PPS and status of implementation of this strategy in Indian firms. The results show that firms are paying higher attention to structured waste management and the priority is early cost advantages hence prefer less investment prone processes modifications. The initiatives are geared mainly due to short term advantages than top management commitment and proactiveness to comply with environmental regulations. Firms believe in developing expertise and deploying standard practices. It is evident that firms specifically train employees for PPS implantation, but lags in empowerment of employees, resources allocation, cross-functional team formations and rewards for the employees. Also, PPS strategy is implemented as stand-alone strategy and lacks the integration with core corporate strategy. The study adds to existing literature by segregating PPS from other similar strategies like product stewardship and cleaner technology. Tested measure of PPS shall help managers to assess their performance to achieve pollution prevention goals. Further, the paper discusses some important managerial implications.

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1. Introduction

It is evident from empirical studies that with pollution prevention (P2) and waste reduction strategies firms witnessed reduction in operational costs, avoidance of litigation risk and improvement in profits due to suitable organisational continuous improvement capabilities in business and production processes (Christmann, 2000; Hart and Milstein, 2003; Sharma and Vredenburg, 1998). Considering that returns on investment on P2 measures are faster (Danihelka, 2004), achieving goals of P2; thus, may prove to be an efficient way to increase shareholder value by improving the bottom line for existing businesses (Hart, 1995, 1997; Shrivastava, 1995). Also, in general P2 solutions deliver great savings in comparison to end-of-pipe control solutions due to their

short payback periods (Abou-Elela et al., 2008). Goals of pollution prevention strategy (PPS) are far wider than activities leading to temporary achievements of pollution control.

Researchers have discussed implementation of pro-active environmental strategies. Aragon-Correa (1998) surveyed firms in Spain and realized that the firms with the proactive strategies employed corrective and preventive approaches to address the protection of natural environment. Based on understanding derived from North America, Europe, Japan and other countries; Berry and Rondinelli (1998) identified elements of successful environmental strategy as support of top management, clearly stated environmental policy, declared and measureable goals, participatory decision making by employee engagement, and stricter monitoring, auditing, reporting and assessment system. Christmann (2000) studied American firms to establish that capabilities related to process innovation and execution are complementary assets that helps in determining environmental performance leading to cost advantages. Ramus and Steger (2000) studied European firms to understand the important environmental policy factors and management support behaviour leading

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to employee's eco-initiatives. [Sharma and Vredenburg \(1998\)](#) found out that Canadian firms having capabilities related to higher order learning, continuous innovation and stakeholder integration were proactive in implementing environmental strategies.

Few studies have been taken in emerging markets context. [Lourenco and Branco \(2013\)](#) studied Brazilian firms to conclude that firms performing better on sustainability aspects are usually large in size and have better returns on equity. In a study related to Mexico's sustainable supplier program, researchers ([van Hoof and Lyon, 2013](#)) found that waste prevention was preferred over technological innovations or best practices due to higher net present value. [Delai and Takahashi \(2013\)](#) attempted to provide insight about sustainability management practices in Brazilian retailers and revealed that firms have focus on aftermath remediation than elimination of root causes, and sustainability practices are not integrated into a management system. [Jabbour et al. \(2012\)](#) analysed ISO 14001 certified Brazilian companies and concluded that preventive environmental management practices in these firms didn't create a competitive advantage; however these practices positively influenced manufacturing priorities as cost, quality, flexibility and delivery. [Jabbour et al. \(2013\)](#) also studied Brazilian automotive companies to prove that environmental management practices are influenced by human resource management and lean manufacturing practices.

In last two decades, the industrial sector in India has placed considerable emphasis on matters related to the natural environment. Most of the information on PPS implementation by Indian firms is found in sustainability/environmental reports or business publications. Also, most of the existing research on PPS implementation involves firms based in developed countries ([Aragon-Correa, 1998](#); [Berry and Rondinelli, 1998](#); [Christmann, 2000](#); [Ramus and Steger, 2000](#); [Sharma and Vredenburg, 1998](#)). Literature on determinants of proactive environmental strategies have identified parameters as pressure from non-governmental organizations, external and internal factors of organization, managerial and strategic aptitude ([Gonzalez-Benito and Gonzalez-Benito, 2006](#); [Lozano, 2012](#)) and, regulations and competitive forces ([Christmann, 2000](#); [Dean and Brown, 1995](#); [Russo and Fouts, 1997](#)). In similar line, a study on Indian firms identified internal and market pressures as main drivers of proactive environmental management practices ([Singh et al., 2014](#)). Similarly, an another study revealed institutional pressure as a major determinant along with manager's attitude and business case of risky investment as factors in the context of developing country ([Sangle, 2010](#)).

However, the existing literature on determinants of proactive environmental strategies does not focus on factors that are responsible for adoption or implementation of a specific strategy linked to P2, product stewardship and cleaner technology. It only identifies factors that can explain adoption of any beyond-compliance strategy. However, as organizational setup, resources and capabilities required to implement each of these strategies are different ([Hart, 1995](#)), it is argued that they should be dealt differently. Although sustainability requires simultaneous implementation of multiple proactive environmental strategies ([Hart and Milstein, 2003](#)), some approaches deliver results immediately while others exhibit long-term benefits. Some firms, at a given point in time, are likely to choose a strategy that may fetch early economic returns without significant investment based on criteria like firm size and available resources, position in value chain, internationalization, industry sector and geographical location ([Gonzalez-Benito and Gonzalez-Benito, 2006](#)).

Among sustainability and pro-active environmental strategies, PPS is considered to deliver early cost advantages with incremental improvements ([Hart, 1995](#)), so many firms have taken decision to implement PPS in developing nations ([Schoenherr, 2012](#)).

Somehow, researchers have not defined a scope of PPS as a stand-alone strategy. This leads to ambiguity while evaluating performance of implementation of this strategy. Since decisions to start P2 activities are yet to be taken by many firms in many developing nations ([Hoque and Clarke, 2013](#)), it is important that these firms learn from the early implementer of PPS. So that success of implementation of this strategy in some firms can be replicated in others.

This article aims to isolate PPS from other sustainability strategies. Further, it empirically analyses the important factors of PPS strategy based on questionnaire based information of sixty sustainability oriented Indian firms. This study is likely to help firms that are in the process of implementation or likely to adopt PPS in near future so that there is no trade-off between the natural environment and business profits.

2. Literature review

2.1. Pollution prevention strategy

P2 is defined as "the use of materials, processes, or practices that reduce or eliminate the creation of pollutants or wastes at the source" ([Freeman et al., 1992](#)). P2 solutions aims to conserve the natural resources through optimal and efficient usage. P2 activities helps in reducing various costs by improving the efficiency of production processes leading to better material utilization and safer working environment to employees as well ([Hart, 1995](#); [Moss, 2008](#); [Shrivastava, 1995](#)). Processes redesign, substitution of input raw material, recycle and reuse of materials and by-products, and incremental improvements in technologies may fetch objectives of P2 ([Dechant and Altman, 1994](#); [Porter and van der Linde, 1995](#)). However, P2 has been misinterpreted as waste minimization defined as "the reduction, to the extent feasible, of hazardous waste that is generated or subsequently treated, sorted, or disposed" ([Freeman et al., 1992](#)). Hence, waste minimization just relocates the sources of pollutants and can be termed as end-of-pipe control measure. Waste management can be linked with litigation issues having origin in waste disposal within or outside the firm's boundary, thus firms can be exposed to unwanted risk and cost; so firms tend to be proactive and cautious in adopting systematic waste management programme with suitable allocation of resources, audits and stricter monitoring. Direct regulations pertaining to pollution prevention and waste management can have a determining positive result leading to fusion of pollution prevention and control methods ([Testa et al., 2014](#)).

2.2. Pollution prevention strategy versus other strategies

Unlike pollution prevention activities which are limited to production process, the scope of product stewardship strategy (PSS) extends beyond the organisational boundaries to include different phases of the product life cycle such as raw material extraction, product use and disposal at the end of life ([Hart and Milstein, 2003](#); [Roome and Hinnells, 1993](#); [Seuring and Muller, 2008](#)). A PSS strategy directs the efforts of the stakeholders or value chain participants aimed at avoiding or reducing the negative impacts of the product life cycle on the natural environment and society ([Cerin and Karlson, 2002](#); [Veleva, 2008](#)). It serves to create differentiation in the market place by building reputation and legitimacy ([Hart and Milstein, 2003](#); [Hoeffler and Keller, 2002](#)). PSS involves integrating the voice of the stakeholder into business processes through extensive interaction ([Dyllick and Hockerts, 2002](#); [Sprengel and Busch, 2011](#)). Cleaner technology strategy (CTS) aims beyond removing negative impacts on society and natural environment due to production and consumption by a

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