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Environment Responsiveness of Petrochemical Organisation in India

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Abstract

Many companies have announced ambitious sustainability plans to reduce their carbon foot print and save environment. Product manufacturers are redrawing their marketing plans with emphasis on the eco-friendly theme. Companies are leaving no stone unturned in their quest to reduce carbon footprint in their new processes and raw material which can help these companies achieve their sustainability goals in the face of this competitive world, organisations need to adopt different strategies. Green effort and environmental responsiveness towards society go a long way for business sustenance. Growing awareness about the environment has made the consumers conscious about importance of eco-friendly products and they are ready to pay the premium. As a result , product manufacturers are incorporating changes in the products and processes to suit the customer demand. Today the customer awareness on health consciousness and eco-friendly products have gone up. Manufacturing companies are looking at improving the process and products as well as reduce the environmental loads. Several literatures were published regarding different key drivers and motives for these green efforts made by companies. However, detailed studies were not found in petroleum and petrochemical Industries and approaches adopted by Indian Public Sector Undertaking (PSU) and Private sector organisation. In this paper detailed study is being conducted for major PSUs and private sectors in India. The key initiatives are elaborated and compared to evaluate organisations' ecological responsiveness and societal impacts are discussed. Global detergent players like HUL and P&G and two major petroleum and petrochemical industries of neighbouring country, China and SHELL Global have been referred in the context as these companies are supposed to be the leaders in Sustainability initiatives. Data have been collected through the content analysis of companies' web-sites and documents.

Keywords : Environmental Management System(EMS),Recycling, Renewable energy, GHG emission, Carbon capture and storage, Green packaging, Sustainable development, Eco-product

1. Introduction

Deterioration of the natural environment poses risks and opportunities for business organizations. Some firms respond by adopting environmental management strategies. Environmental regulations impose additional constraints on business organizations, such as the European Union target of a 20 percent GHG emission reduction and 20 percent renewable energy use by 2020 (Barroso 2008). As worldwide environmental degradation becoming more pronounced-global warming, resource depletion, polluting environment etc. the pressure on organizations intensifies.

Environmental sustainability has become a relevant issue both for companies and society (Nidumolu et al., 2009).In order to face the environmental sustainability challenges, companies adopt specific environmental strategies (e.g. Stead and Stead, 2000;Aragon-Correa and Sharma, 2003; Hoffman, 2000; 2008; Orsato, 2006).

In the paper of Albino et al. (2009), there is first evidence that higher implementation levels of environmental strategies are positively linked to the development of green products for companies with strong commitment toward environmental sustainability.

Environmental strategy and green efforts are influenced by the degree of company's commitment towards sustainability. The aim of this paper is, thus, to study the influence of the adoption of different environmental strategies towards green development and Sustainability.

Our principal aim is to study the environment responsiveness of the major Petroleum and petrochemical industries in India with the in-depth study of the sustainability and annual report of the respective industries to find the progress in this respect and find the shortcomings for future improvement to the development of innovative environmental strategies; to the creation and evaluation of systems that break new ground in

environmental responsibility; and, ultimately, to the improvement of the natural environment so as to achieve environmental sustainability. Sustainability is more than a concept in today's competitive business. Companies go green in all facets of business to prove that it is environment friendly and takes due care for the society. Concerns about environmental quality and resource depletion are normal to modernisation and has become more pronounced with industrialisation (Brimblecombe,1987;Sheail,2002;Simmons,1996).

Green transformation transcends beyond the reduction of carbon dioxide emissions, energy conservation, waste reduction. Companies aligning their products, processes as per the needs and aspiration of the stakeholders through technological innovation which has revolutionised the industry to infuse uniqueness in their effort, capabilities and product thereby enhancing their competitive position. Companies have to be have techno-commercial competitiveness with improved and environmentally sustainable practices and technology to be in the business. This will be enhanced and effectively implemented with the help of Government support and regulation to be made it uniform system for all across industries.ISO 14001,an internationally accepted standard for an effective environmental management system by which companies identify and understand how business impact environment and relevant environment laws.

Green development is one of the primary focus in sustainable development as it prioritises environmental sustainability over economic and cultural considerations. Organisations view environmental and social challenges as opportunities by way of integrating the same in the business process with desired innovation and entrepreneurial solution. Out of the key four aspects of sustainability i.e. societal influence, environmental impact, organisational culture and economic, we concentrate our discussion here on environmental aspect. Environmental factor in an organisation can be attributed to external and long term focus which impacts society and organisational culture and thereby economic aspect in the long run. So, good corporate performance depends equally on stewardship of the financial and environmental resources. As sustainability focuses on future for which present utilisation of resources are necessary, hence, good environmental performance by organisation goes as an investment for future. The social and environmental and financial accounting and reporting are seen to be coincidental.

Any organisational actions impose externalised costs and benefits upon external environment and traditionally excluded from its accounting with the reasoning that it is not easy to measure. Organisations are setting their agendas for environmental performance improvement mainly to comply with existing or anticipated legislation and publicity and image building. Often budgetary limitation become a constraint and environmental performance measure selectively chosen to depict improvement rather than providing a balanced performance. However, more and more companies are by and large showing their concern regarding environmental performance and it is resulting in business benefit, increased welfare for society at large, increased motivation, increased productivity. The relationship between corporate governance and all aspects of organisation's performance including environmental performance can be viewed as to what percentage weight are attributed to the respective aspect. The extent of the disclosure including the environment responsiveness through the reporting has come in a bigger way as organisation recognised the benefit for increased disclosure to all its stakeholders.

An important aspect of sustainability activity by a organisation is its reporting-apart from financial reporting, social and environmental accounting recognises that the organisation operates in a society, activities of organisation impact upon the external environment, hence, the accounting should be more outward looking. External environment must recognise the business environment, local social environment and wider global environment. The growth of environmental data, as part of the management information system and reporting is need of the society. Though, the reporting should be voluntary in nature, however, more and more regulatory mechanism are being placed by government. Organisation should take proactive action to improve upon the existing level in anticipation of the future more stringent regulation. The increased disclosure of the activities of the organisation is a reflection of the growing influence of stakeholders. Social accounting gathered momentum since 1970.

Solomons (1974) has come out with a broader model without mentioning actual measurement of external costs and benefits as per the table-1.

In the present domain the environment is considered as part of the organisation and not treated as external factor which necessitates giving increased weight of the use of primary resources. Techniques for measuring environmental impact and reporting has grown over the years among various organisations and various models have been proposed. Different views have emanated regarding environmental accounting and auditing.

An environmental audit is an investigation and recording of the activities of the organisation in order to understand its effects upon the external environment. It entails the extent of compliance with regulations, effectiveness of pollution control procedure, extent of energy efficiency and waste reduction, development and usage of sustainable resources and renewable energy, life cycle analysis of products and processes, the possible incremental capital investment to effect these issues, environmental management procedure. The objective of the audit is to understand the impacts of organisational activities and assigning cost to it.

Accountability relates organisation's recognition for its actions affecting external environment. Reporting should cover qualitative aspect and quantifications and be transparent. Reports must be relevant, comprehensible, verifiable, complete(both positive and negative information to be included) and comparable.

Successful implementation depends on the support of the top management and involvement of the cross functional team. Increased cost for improvement in environment by way of process and product modifications should be related to the benefits accrued in the short as ways long term.

Organisation's program and focus to establish environmental factors as a priority at senior management level helps the development of an orderly map to capture the benefits. To manage its implementation in an orderly and effective manner a evolutionary approach is better than revolutionary implementation of requirements. It requires organisational leader, culture to develop and implement and the preparedness which impacts competitiveness and adaptability to adjust itself for any changed scenario. Organisations find that effective sustainability management results in significant value addition by creating quality earning and competitive advantage along with economic benefit.

Organisation undergoes constant change with the passage of time. The main causes of change are economic, social and technological. Environment comes under social cause. Environmental management and performance measurement is required to be connected to overall business perspective because of its strategic importance as it contributes as a part of a balanced scorecard of business performance measures. This leads to insights into other areas of performance measure and practical application and helps organisation to take a balanced view in the performance management process on the basis of quantitative data as well as qualitative data. Social and environmental accounting is meant for working towards sustainability. There is a growing trend of companies to provide separate social and environmental reports under sustainability report. External verification or audit is necessary as a part of the process of reassuring and safeguarding stakeholders. Recent advent of rating system are becoming popular to enable a quick comparison between organisation at a glance based on different important parameters including environment.

General perception of developing-country firms as agents of environmental sustainability are pessimistic-assumed to be environmental laggards, particularly when compared with the industrialized country counterparts.

The article in this issue studies the role and responsiveness of developing-country firms as potential agents in processes of sustainable development with the context of Indian Petroleum and petrochemical industries. In the following analysis we see how the public and private sector organisations in India embracing aspects of environmental protection and competing against global leaders of environmental sustainability in the manufacturing and dissemination of clean technologies. In particular, we see the efforts are aligned as an approach towards globalization keeping in mind global dynamics and local responses. Trade liberalization and increased foreign direct investment, are key drivers in improving developing-country firm environmental performance. Foreign and domestic firms compete to control clean technology markets. Local communities target transnational and domestic firms about the limitations of their environmental commitments.

In this paper, the environment responsiveness of Indian petrochemical industries are studied by in-depth analysis of sustainability reports of major petroleum and petrochemical industries in India and comparing their approach with selective global petroleum and petrochemical industries.

Study on corporate environmental responsiveness were made in business organizations in India. Based on theoretically informed case analysis, attempts were made to operationalize corporate environmental responsiveness as a two order construct. It is found that level one (the lower level) responsiveness is driven by pressures arising out of powerful supply chain, customers and institutional pressures resulting from internationalization. The drivers for organizations at level two (the higher level) responsiveness are associated with organizational identities and cultures rooted in a long history of social responsiveness.

Past literature on the "greening" of industry and environmental policy has provided various insights into the determinants of the firm's innovative behaviour in cleaner technologies. Studies were made to endorse empirically tested theoretical models. It is also examined how dependence between willingness to innovate in

cleaner technologies and its determinants, and to explore the conditions under which the firms' innovative behaviour could be fostered. Statistical tools indicate, against the general wisdom, that stringent environmental regulation without consideration to the dynamics of technical change, and environmental and economic risk perceptions in the part of firms would play against the promotion of innovation in cleaner production.

One of the societal impacts of the sustainability movement is the shift away from the pursuit of growth toward an emphasis on conservation. A verifiable set of propositions for sustainability suggested by author Richard Heinberg (2010) are: i) A society that continues to use resources on unsustainably will fail. ii) Growth in population and/or rates of consumption of resources cannot be sustained. iii) Renewable resources must be consumed at a rate less than or equal to production. iv) Consumption of non renewable resources must decline at a rate greater than or equal to the rate of depletion. v) Wastes introduced into the environment from human activities must be recognized and rendered harmless to biosphere functions. The environment responsiveness circles around all these propositions. Rijsberman and Van de Ven (2000) spoken sustainability concerns how well ecological, environmental, and hydrological systems survive. United Nations came with detailed report for the sustainability of people, planet, and profit (United Nations, 1998).

Operationalizing sustainability policies is important. Three-pronged implementation strategy involving planning, environmental impact assessment, and environmental management systems is required in society as well in organisation.

Sustainability depends upon the political culture of the locale (Budd, Lovrich, Pierce, and Chamberlain, 2008).

Government may implement strategies for carbon neutral industries, however, disconnects are observed between central government sustainability initiatives and effective implementation (Ball, Mason, Grubnic, and Hughes,2009). Companies must adopt both informal and formal reporting, but that their informal reporting should be coupled with both practical organizational strategies and operational activities for green responsiveness. Successful organizations must adopt distinctive accounting and accountability processes.

As Ball and Grubnic (2007) conclude, "These organizations address themselves to their 'customers' when they account for the quality of service delivered, and also to 'citizens' when they account for water availability and conservation"(p.342).

At the G20 summit in 2009 they agreed to make "the best possible use of investment funded by fiscal stimulus programs towards the goal of building a resilient, sustainable, and green recovery… We will make the transition towards clean, innovative, resource efficient, low carbon technologies and infrastructures" (Sisk, 2009,p.13).

This gives enough indication that Govt. should patronise the environment responsiveness of industries in a bigger way. Earlier researches suggest that companies are increasingly talking about sustainability, but that their efforts are aimed primarily at corporate social marketing and they are not adopting conservation for conservation's sake. Earlier study examined what factors affect firms' decisions to adopt a proactive environmental strategy and whether pursuing proactive environmental strategies leads to improved financial performance. Using longitudinal data from 1990 to 2003 for the four most polluting industries in the US (Pulp & Paper, Chemical, Oil & Gas, and Metals & Mining), research empirically models the causal relations between firms' environmental performance and their financial resources and management capability. Analysis suggests that the positive association between environmental performance and financial performance is robust. Although becoming "green" is associated with improvement in firm performance, such a strategy cannot be easily mimicked by all firms. Study also explored the evolvement of firms' environmental behaviour and influencing factors. Using empirical data from 167 firms in China, the simulation results revealed that firms' environmental behaviour followed this evolvement path : defensive behaviour, preventive behaviour, and enthusiastic behaviour. Computational experiments indicated that with increased financial ability and level of environmental preparedness, the number of firms in all three categories of environmental behaviour increased and so did their profits. With increased public pressure, the number of firms with defensive environmental behaviour and their profits decreased, but the number of firms with preventive and enthusiastic environmental behaviour and their profits increased. On the other hand, when managers' education level increased, the number of firms with defensive behaviour decreased, but their profits increased slightly, though the number of firms with preventive and enthusiastic behaviour and their profits increased sharply. In addition, with the increased regulation level, the number of firms with a different category of environmental behaviour and their profits decreased.

There is plethora of studies and discussions on the significance of environment responsiveness and its relation with sustainable business. The growing need and its importance has been evolving for the sake of the society. Therefore, presently the studies are required in developing country like India which is one of the key driver of

global growth along with China in South east Asia. The rest of the globe particularly in developed countries where the GDP growth is flat or negative, India has a huge potential for growth which can be sustained with the concept of green growth and profit. The study aims to elaborate on the essential role played by Indian Oil, one of the leading PSU in its petroleum and petrochemical business. The approaches made by leading private sector like RIL and other Global organisation like HUL,P&G,SHELL Global and Major organisations in neighbouring country, China are also discussed. At the end, effort is made to come out with the challenges what can be tapped further for sustainable development in the petroleum and petrochemical sector in India.

2. Why companies go green: literature survey

A product can be defined as 'green' "when its environmental and societal performance, in production, use and disposal, is significantly improved and improving in comparison to conventional or competitive products offerings" (Peattie, 1995; p. 181). Ottman et al. (2006; p. 24) state that "although no consumer product has a zero impact on the environment, in business the terms 'green product' or 'environmental product' are used commonly to describe those that strive to protect or enhance the natural environment by conserving energy and/or

resources and reducing or eliminating use of toxic agents, pollution, and waste". This leads us to understand the aspects of green product development (conceived as a product development process in which environmental issues are integrated in order to create a green product) and then the potential impact on it of different environmental strategies.

Earlier studies have revealed the cause for environment responsiveness as regulatory compliance, ethical concerns, unforeseen events, stakeholder pressures, top management initiative and competitive advantage (Dillon & Fischer, 1992; Lampe, Ellis,& Drummond, 1991; Lawrence & Morell, 1995:Vredenburg & Westley, 1993; Winn, 1995).

Corporate ecological responsiveness can be defined as a set of corporate initiatives aimed atmitigating a firm's impact on the natural environment(Pratima Bansal, Kendall Roth,2000).

Legislation, economic motives, legitimation (refers to the desire of a firm to improve the appropriateness of its actions within an established set of regulations, norms, values, or beliefs [Suchman, 1995), or ecological responsibility. Motivations associated with variables that included cost reduction, increasing market share, reaction to competitors, reaction to consumers, building resources, survival, legislation, avoiding penalties, license to operate, managing risks, doing the right thing, and avoiding personal risk.

Mentions were made on sustainable development, corporate social responsibility, institutional theory, strategic management theory, stakeholder management theory, resource dependence theory, and the resource-based view of the firm. In some cases, competitiveness and profit orientation were linked but they are not so. However, competitiveness as referred in literature as the potential for ecological responsiveness to improve long-term profitability. Ecological responses that improved competitiveness included energy and waste management, source reductions resulting in a higher output for the same inputs (process intensification), eco labelling and green marketing, and the development of "eco products." Ecological responsiveness led Firms to sustained advantage and hence improved their long-term profitability. Firms compete on price and quality and are now competing more on the environmental issues, as well. Competitive advantage can be gained through environmental responsibility. It may be simple housekeeping measures that required minor changes to processes but improved operational efficiency, which increased competitiveness through lower cost, conserving the energy, monitoring the existing process, recycling of waste, developing ecologically related resources and capabilities to build long term profit potential. These resources and capabilities were developed through green marketing, source reductions and process intensification, and new capital equipment. Environmental initiatives are seen as both an environmental opportunity and a business opportunity. It is easier to implement if it is commercially viable.

Petroleum industries reduced the level of benzene (a toxic substance) in its petroleum products because it discovered another use for the benzene. With the forward integration, the same is taken as an input for production of Linear Alkyl Benzene which goes as a upstream product of detergent production. Reduction in sulphur in intermediate and final product in refinery units and processes led to the minimisation of emissions and a step towards environment friendly approach. Minimisation or removal of elements associated with crude processing helps environment to remain clean and less polluted. The elements removed so in the process such as sulphur are marketed for making sulphuric acid for different application in the society. The other toxic elements or associated compounds are re-circulated in the system so to as minimise emission/loss in the environment and partly to conserve energy through reusing the same in the process. One of the application of sulphuric acid is in

sulphonation of Linear Alkyl Benzene to make the intermediate product LABSA(Linear Alkyl Benzene Sulphonic Acid) which goes as the active matter for production of detergents.Several respondents indicated that if environmental science was more definitive in assessing the ecological impacts of alternative activities and if consumers were more demanding, then they would more likely show greater ecological responsiveness.

Firms which don't have a policy will end up going out of business because they won't be accepted by society for license to operate. The corporate environmental policies of the firms should aim at keeping up with environmental regulations. Specific stakeholders, such as the local community, customers, and the government, express norms. Institutional pressures, viewed as an "iron cage" (DiMaggio& Powell, 1983), reminds images of passive compliance, with minimal space for discretion. Firms avoid bad publicity associated with their ecological effects.

Sanctions, fines, penalties, bad publicity, punitive damages, avoiding clean-ups, discontented employees and work force and risks are reflected in the firms' initiatives in that they reduce risks by complying standards rather than publicized their ecological responsiveness. Firms operating within a regional boundary usually subject to the same regulations and social norms, often operated with similar standards in a socially interconnected environment.

Firms act out of a sense of obligation, responsibility, or philanthropy rather than out of self-interest (Bucholz, 1991; L'Etang. 1995),corroborating the findings of Lampe and colleagues (1991)-satisfaction and high employee morale were short-term benefits from their ecological responses. Environment management leadership comes from the top of the organisation. Competitive advantage is high when issue salience is high and a firm is able to make the issue salient to its stakeholders. The importance of cohesion in influencing firms operation can not be denied. Organisation with more homogeneity with Local guidance, agreement and the community are more likely for sustenance. Firms in fields with high cohesion are less likely to be driven by sheer competitiveness. Organisation’s ecological agenda often competes with other functional agendas for resources. With the given background the organisation have, will guide its range of initiatives or responses. The firm can promote itself as a green alternative. This combined interest in competitiveness and ecological responsibility often leads to innovations. Innovations result in more eco-friendly products or processes for which there are efficiency or marketing gains, or products or processes that are superior in other ways. Technology has developed to remove benzene from gasoline, resulting in an eco-friendly gasoline and the opportunity to use the surplus benzene elsewhere. Organizations evaluate their long-term relationships with the natural environment to promote social interest.

The three pillars of sustainability offered by Viederman(economy, community and environment) are widely accepted. Environmentally sustainable organization is that maximize resource efficiency and minimize harmful ecological impacts (Starik and Rands 1995).

Organisations to achieve this goal will have to address environmental issues such as global warming, ozone depletion, acid rain, toxic wastes, and pollution (Shrivastava 1995). Broadly to measure the environmental impact of an organization tend to focus on the resource use and the general footprint of the organization (e.g., Kleindorfer et al. 2005).

Research looking at the linkage between environmental performance and operational performance finds that being green does pay. Russo and Fouts (1997) found that firm economic performance increased with improved environmental performance. This result has been validated by authors in many different ways (e.g., Christmann 2001, Melnyk, Sroufe and Calantone 2003, Pagell et al. 2004). Literature points toward improved operational performance for organizations performing well environmentally.

Sharma and Vredenburg (1998) found that proactive responses to ecological issues lead to the development of unique organizational capabilities which is different from the firms who are reactive and only do the minimum required by law.

Benefits to business greening by the way of reforms which will protect environment by mitigating resource scarcity, reducing energy consumption and curbing waste disposal and reduce production cost can be achieved through eco-efficiencies and improved resource management systems. Any prosecution will not only make company pay for damages and restoration for environment but also loss of customer confidence, investors and insurers. Any current deficiency in the environmental performance of industrial system will open up new economic development and technical innovation. Effective environmental management strategy will act as a platform for commercial success as it focuses on health and safety for all thereby promoting a positive corporate image.

Policies promoting sustainable production and consumption, interventions by way of regulations, subsidies, taxes, financial supports for clean technology R&D are required for effective implementation of green issues.

Extended Producer Responsibility(ERP) is a policy tool which makes producers financially or physically responsible for their products after useful life. While costs are shifted from downstream to upstream resulting in difficulty in implementation, however, costs can be reduced through the redesigning the product, process and packaging to improve in profitability by cutting cost. This approach to design leads to environmental economic benefit of ERP.

Ecolabel programs are designed to promote sustainable production and consumption by setting an environmental standard for consumer goods, mostly through third party certification.

International Environmental Certification:ISO 14000 represents a series of international standards on environmental management.

Companies must comply with legislation covering pollution control and the treatment and safe disposal of waste. R&D capacity should be enhanced to take care of environmental and industrial systems. Environmental consideration should be integrated into the process and product design. Life cycle analysis helps to explore the entire range of activities with significant environmental impacts.

To ensure that a firm's responses are in its long-term interests, it needs a carefully developed approach for dealing with existing and arising environmental challenges. It needs to internalize environmental issues in a way that is both efficient and consistent with its long-term goals.

Academy of Management Review, 16/4 (1991): p 691-7 states that Process of Corporate Environmental Responsiveness emanates from Principles of Corporate Environmental Responsibility. Processes address the issues through policies and programs to give outcome of Corporate Behaviour. Disposal of hazardous waste is rapidly becoming a very costly affair. Since consumers profess themselves willing to pay extra for greener products, a product's good environmental performance can in principle be used as a marketing edge. However, such green marketing campaigns tend to attract extra scrutiny, which may prove embarrassing. Procter & Gamble's introduction of a laundry detergent needing less packaging was greeted with a headline in a British newspaper "Animals Die for Green Soapsuds". Industrial customers are also becoming more demanding. Firms should continue to produce a product while and wherever it is legal and profitable to do so, and they should maintain adequate safety measures and labels. Imposing one's own higher standards on suppliers is one example. Firms in countries with tough environmental legislation can turn this into a source of competitive advantage, as happens in REACH compliance imposed by EU.

Although meeting or surpassing existing environmental standards in itself addresses social legitimacy or public responsibility, it takes managerial discretion to see how such strict standards can be turned to advantage. This should involve close cooperation with customers to adapt the substitutes to their needs and should involve offering different products—each as environmentally safe as possible—to each individual group of users. Creating simultaneously the impression of environmental protection and making free trade though conflicting objectives could be prevented by appropriate harmonization. Turning whatever intentions result from the processes of corporate environmental responsiveness into operational environmental programs remains a major challenge. It is possible to avoid having to implement the environmental programs from scratch and instead use the synergy available through the programs already in place. Obviously, the relevance of any analogy and the extent to which it can be exploited is fully situation dependent. Process related and product-related programs are directly and physically concerned with the environment. Accidental pollution, such as leakages or spills, is caused by the production process going out of control, without the appropriate countermeasures being taken can be addressed through statistical process control (SPC), where the process is stopped whenever some factor (e.g., process temperature) reaches a critical level, as exceeding that level means the process is out-of-control and will not yield an acceptable quality. Some chemical plants have a computerized ecological monitoring system with. Appearance of waste and pollution in a production process can be taken as a sign that the process is not as efficient as it could be; it is not fully understood or properly controlled. Because waste costs money to generate, and again to dispose of, it is only natural to aim for zero waste or zero discharge. There is a clear analogy with the target of zero defects, one aspect of total quality control (TQC). Despite being unachievable, zero defects has proved useful as a target, imposing a high degree of discipline on production through its philosophy of continuous improvement. it is easy to imagine "green groups" as a step towards zero waste. By cooperating closely with all other partners in the distribution chain, wastes of time can be eliminated and the chain as a whole can become more flexible and competitive. Many products are potentially dangerous when used unprofessionally

(e.g., chemicals). Some chemical firms show their sense of responsibility by arranging product stewardship, guiding customers in use and disposal of their products. This can be considered as part of a firm's after-sales service. PCRA(Petroleum Conservation Research association) is one of the Govt body in India with the participation of all domestic oil industries to formulate strategies and promote measures for accelerating conservation of petroleum products leading to environment protection, energy security and sustainable development. However, this sort of central body in petrochemical sector with the participation of all domestic industries are yet to take shape in India to take care of holistic view on environment issues and sustainability.

Like Standard management accounting which is often accused of hampering investment in new, uncertain technology, ecological investments make more difficult to justify. A proper waste accounting system helps to show the real costs associated with a process, and therefore enables a more appropriate evaluation of waste reduction investment proposals. An additional advantage of comprehensive hazardous waste accounting and tracking is that unidentified waste can cost many times more to dispose of than identified waste. Publicly announcing the full results of internal environmental measurements can be a useful management tool, since this disciplines the firm into actually collecting all data needed, and then ensuring that their environmental performance does not force them to announce embarrassing data. Repeated reports of near accidents will increase public concern enough to (legally) enforce appropriate measures. Because a firm's viability can depend as much on its environmental as on its financial performance, stakeholders should not only be given access to financial reports, but also to adequate environmental reports. And, just as the financial data are audited by independent parties, firms should also regularly arrange environmental audits on all their operations to ensure that the environmental technology and the environmental management programs are performing properly. No environmental program has a chance if employees are not adequately trained and motivated, just as is the case for introducing TQC concepts.

There is a need to implement the proper accounting system as far as the environment audit is concerned in Indian domestic petroleum and petrochemical industries. A key concept of the environmental imperative is environmental uncertainty, the degree to which forces external to organizational boundaries are dynamic, complex, and threatening.

Environmental scanning can be viewed as an organization's early warning system that detects problems in the organizational environment. Environmental scanning is ''the gathering of information about publics, about reactions of publics toward the organization, and about public opinion toward issues important to the organization'' (Dozier, 1986, p. 1). External or environmental variables included five threat variables(litigation, regulation, bad publicity, reputation damage, and legitimizing activists), three industry environment variables (variability, degree of competition, and resource availability), and two constraint variables (political and social support for business).Environmental Scan is the means by which the firm updates and develops its planning with respect to external trends and events, what could be called the Internal Scan serves a equally with respect to the internal appraisal. The environmental appraisal may promote partial analytical approaches, not only in evaluating strategic options, but also in building the models of success and best management practice that will help organisation to long term business sustenance. The internal appraisal is part of a process of analysis and diagnosis which plays a underlying role in strategic management. The analysis and diagnosis of the external business environment is the means by which the firm identifies strengths, weaknesses, opportunities and threats(SWOT) which will influence its future course of business.

Indian Government is planning to invest a total of US$250 billion by 2017 for promoting green business and sustainable business practices. In June 2008, India announced a National Action Plan on climate change(NAPCC) which spell out the policy frame work on policies and programs. India is committed to setting up national green house gas emission target. Key areas are renewable energy, waste management, water management and sustainable mobility.

3. Theoretical framework-Environmental strategies

New environmental regulations and standards, growing stakeholders' pressures, and the development of new clean technologies make the competitive scenario around environmental issues highly dynamic (Bansal and Roth, 2000; Sharma and Vredenburg, 1998; Murillo-Luna et al., 2008). To address the issues companies implement specific environmental strategies (e.g. Jose, 1996; Hoffman, 2000; Aragòn-Correa et al., 2008).

Out of several environmental strategies, in this paper, we observed broadly environmental strategies as developed by Albino et al., 2009 :four strategic approaches, the first two more process oriented, and the last two more organization oriented: i) improvement of material eco-efficiency(focused on the reduction of resources

used to produce unitary output); ii) improvement of energy efficiency (aiming at increasing energy savings, and the use of renewable energy sources); iii) implementation of green management (aiming at the development of a systematic and comprehensive mechanism to improve environmental and business performance inside a company); iv) implementation of green supply chain management(addressed to extend environmental measures to the whole supply chain).

4. Analysis and Methodology used

In this paper, environment responsiveness of major petroleum and petrochemical industries in India is studied. References are drawn to Global organisations like Shell Global and the major organisations of neighbouring country, China. The detailed study of Sustainability report of organisations are made on the basis of evaluation of reports in conjunction with content analysis of the annual report and corporate documents. The disclosure related to environment responsiveness is derived from sustainability report and annual reports.

5. Initiatives by Indian major Petroleum and petrochemical Industries

Indian Oil Corporation Ltd.(IOCL): IOCL is a PSU and fortune 500 company has been ranked 285 in the Forbes Global list of 2000 biggest public companies and is in the top 10 of the India list and at the 88th rank in the Fortune Global 500 list in 2013 with a turnover of Rs.414909 crore and PAT of Rs.5005 crore in the financial year 2012-13.Indian Oil is vertically integrated energy company through Exploration and Production activities on the upstream and Petrochemicals and gas marketing on the downstream within India and abroad.

Within the overall ethos of sustainability, environmental sustainability is of special significance to Indian Oil, being an energy company with environmental externalities inherent to the very nature of business. Minimizing the ecological footprint of core operations and products has continued to be a thrust area. Energy Efficiency efforts are a priority as the energy consumption factor of refineries consistently falling every year. Sizeable investments are made for pipelines the main carriers of products. Pipelines as a means of transportation score over road and rail transportation in terms of safety, cost, energy-efficiency and carbon footprint.

Present effort include corporation-wide ecological footprint assessment exercise. Mitigation actions, such as rainwater harvesting, organising carbon neutral events, installation of organic waste converters, solarization of retail outlets and awareness generation programmes are becoming a regular feature in the company. IndianOil has participated in the Carbon Disclosure Project (CDP) India in 2012.

IndianOil is making available BS-IV compliant auto fuels to more and more cities in India, marketing natural gas, auto LPG and industrial LPG and replacing use of carbon intensive fuels such as coal, naphtha, furnace oil etc. It has forayed into green energy space with its investments in wind and solar energy, bio-fuels and also nuclear energy.

The Company has been constantly engaging with all its stakeholders through various channels of dialogue, stipulations, and advice from time to time. The Government of India owns a majority of Indian Oil shares at 78.92%. The Government of India, besides issuing administrative and functional directives, has also formulated several policy guidelines that significantly impact the Company's operations and its socio-economic-environmental programmes.

Indian Oil adopts the Precautionary Principle in addressing the environmental issues by adopting a proactive approach and going beyond compliance of CPCB(Central Pollution Control Board) standards in effluent management and SO_2 emissions at refinery locations.

Environment issues on water use for the refinery processes, Pollution/ GHG Emissions, Carbon Sequestration measure by way of tree plantation, Energy Consumption, Waste Generation, optimisation of hydrogen use and improved recovery, gradual phasing out of machineries using ozone depleting substance are addressed through various action for mitigation. IndianOil refineries fully comply with the MINAS (Minimal National Standard) set by the Ministry of Environment & Forests, Government of India, and Pollution Control Board with regard to use of water resources and the quality of effluents discharged. Due to green initiatives of the refinery, more than 40% of the complex is under green cover. EIA(Energy Audit) is performed at all of our installations depending upon new projects, revamp of existing facilities, etc. It is carried out as per Environment Protection (EP) Rules by MoEF(Ministry of Environment & Forest) . Any new project/revamp is approved by the Expert Appraisal Committee (EAC) of MoEF and taken up only after Environment Clearance is awarded for the revamp/new project. As a part of sustainability drive Indian Oil is making its office buildings green and energy efficient. Leadership in Energy and Environmental Design (LEED), an international green building rating system

providing a green building status / certification from Indian Green Building Council (IGBC) or US Green Building Council (USGBC).

In addition, important material issues like Greening of products and product supply chains-environmental obligations, achieving and demonstrating sound environmental performance by minimizing impact of operations and products on the environment in the light of stringent environmental regulations on reducing emissions, energy efficiency, water consumption, waste management and renewable energy are also being focussed.

Further, there is growing policy thrust on initiatives in the domain of sustainability. Through its Memorandum of Understanding (MoU) with the Public Sector Undertakings, the Government of India has been bringing enhanced focus on sustainable development and CSR activities. The Corporation has already incorporated targets as per MoU with the Government. The areas where annual performance targets are set are Foot printing exercise for measuring GHG emissions, Water consumption, waste generation across all business units of the Corporation and Rainwater Harvesting. All major events in the corporation are made carbon neutral by calculating the carbon emissions resulting from the event and planting of requisite number of trees to offset them, awareness generation workshops on sustainability, Retail outlet Solarisation. With focus on energy security for the nation, the corporation has started diversifying its energy portfolio to cover alternative, green and clean energy by venturing into wind power generation, solar PV power under JNNSM(Jawaharlal Nehru National Solar Mission), Biofuels, ethanol blended fuel, solarisation, Nuclear Energy projects by forming JV, Hydrogen energy initiative.

As part of its environment-protection initiatives, IOCL has invested in state-of-the-art technologies at its refineries for production of green fuels meeting global standards. Six projects are registered as CDM (Clean Development Mechanism) projects under UNFCCC (United Nations Framework Convention on Climate Change) with total CERs (Certified Emission Reductions) of 96943 units. Four projects are under technical review and issuance of CERs are underway under the aegis of UNFCCC.

IOC's refineries have clear cut target for 'reduction in fuel and loss' and 'specific energy consumption', which are critical in reducing emissions. Specific focus are made on GHG Emissions reduction by implementing upgraded technologies and various ENCON(Energy conservation Projects) measures, air pollutants reduction by complying with stipulates framed under statutory authority, gradual phasing out of its use of ODS(Ozone depleting Source) in the air conditioning systems, Energy & Surveillance Audits, Integrated Management System (IMS); EMS: 14001:2004, OHSAS: 18001:2007 and Recertification of QMS: 9001:2008 All the refineries of IOCL are ISO 14064:1-2006 compliant and energy conservation Projects (ENCON) implemented. The company meets the requirement of A+ level of reporting as specified by GRI G3.1 Guidelines & GRI Oil & Gas Sector Supplement. Emission data Produced in sustainability report are as per IPCC guidelines and ISO 14064 standards. SCOPE 1, SCOPE 2 emissions are reported whereas SCOPE 3 emissions are excluded from the reporting boundary. IOC has commissioned Emergent Ventures India Private Ltd. (EVI) to undertake an independent assurance of its Corporate Sustainability Report for the year 2012-13.

Green Fuel initiative has been undertaken through introduction of Auto-gas (LPG) ,CNG, Ethanol blended petrol (5% ethanol) which reduces carbon monoxide levels in auto emission, blending of bio diesel with High Speed Diesel, eco-friendly bio-degradable lubricants.

Gas Authority of India Ltd.(GAIL): Gail is a leading PSU in Petroleum and Petrochemical sector in India. Its sustainability report complies to GRI G3.1guideline application level A+,IPIECA,API,UNGC. Sustainability aspirations projected up to 2020.E-sustainability module has been launched. It is an integrated energy company with constant endeavour to reduce environment footprint by optimising natural resources, conserving energy and water, adopting cleaner technology, protecting natural ecosystem. GAIL's vision is to be an INR 1,300 billion company by 2020 with an estimated profit of INR 100 billion. GAIL has constant focus on energy efficiency, diversified to wind power, solar power, independent audit of environmental Management System to improve environment and contribute to the well being of the community. It has Partnered with Indian Centre for Plastics in the Environment(ICPE).

Against World average of 24%,the natural Gas is 10% in energy mix in India, and to improve the growth in natural gas is huge. GAIL is exploring thru' R&D for new opportunities for harnessing fuel potential of solid municipal waste and plastic waste, working towards exploring cleaner technology such as hydrogen gas storage, gas hydrates, shale gas, GHG emission reduction, R&D initiative for capturing CO_2 thru' microbial route. It has target for GHG intensity, Energy intensity, Water intensity, increasing waste water recycling, awareness on sustainability, HSE(Health, safety and Environment) target with Govt. of India. It has achieved MOU-HSE

index:98.8%,Turnover-47333 crores, Profit after tax(PAT)-4022 crores(2012-13),started in late eighties with a natural gas transmission company and transformed into a integrated energy company with global footprint

Other issues addressed by GAIL are energy conservation, biodiversity, life cycle assessment, research & development, sustainability risk mapping and vendor management.

Natural Gas in an important component of the country's energy requirement and considering its environmental and economic implications, it is undoubtedly the fuel of choice amongst other fossil fuels.

LNG is the purest form of fuel or gas in order to provide long-term security of the country. Climate change is an integral part of GAIL's Sustainability Aspirations 2020.GHG intensity has gradually decreased since base year 2009-10(28.65%).Other efforts are adoption of Integrated Energy Management Systems, Incubation of Internal energy audit groups at corporate and site level, focused energy audit, reduction of flare and flare gas recovery, Rain water harvesting. Climate change is a material issue for GAIL and in line with the Government of India (GoI) National Action Plan on Climate Change (NAPCC), GAIL has introduced the same in 2008. India has committed to voluntarily reduce its carbon emission intensity (GHG emitted per unit of GDP) by 20-25% by 2020 over the emission intensity of 2005.Green House Gas Accounting has been undertaken as per ISO 14064 and WRI GHG protocol. Global Methane Initiative (GMI) program has been undertaken at different sites through the signing of a MoU between GAIL (India) Ltd. With the United States – Environment Protection Agency (US-EPA).Flares have been designed and operated for smokeless burning. Dry Low Emission (DLE) gas turbines for gas transmission through Pipeline were installed to reduce the emissions footprint. At all major locations of GAIL Natural Gas is used as feedstock & fuel stock to virtually rule out Suspended Particulate Matter (SPM) and Oxides of Sulphur (SOx) emissions. Likewise Low NOx burners have been installed and operated to control oxides of Nitrogen (NOx) emissions. Provision of adequate stack heights and their monitoring for dispersion of flue gas emissions and keeping the ground level concentrations (GLCs) well under limits specified in National Ambient Air Quality Standards (NAAQS) were ensured at all operations of GAIL. At GAIL's Petrochemical unit for continuous monitoring of Ambient Air Quality not only Fixed Monitoring stations are used but Mobile Monitoring stations were also used. Similarly Online analyzers were installed in all the stacks for continuous monitoring of stacks and provision has been made for all upcoming projects Installation of gas detection system is being done at major plant operations to ensure quick detection and control of a gas leak. Similarly comprehensive mechanical preventive maintenance practices are in place to arrest fugitive emissions. GAIL observed Earth Hour - a global initiative by WWF besides observance of World Environment Day and the Oil and Gas Conservation Fortnight at all GAIL's operations and major work centres. Periodical monitoring of the sound levels are carried out at all plants of GAIL to ensure correct operation of equipment and through appropriate system design to check noise level. A large majority of the installations of GAIL are certified with Environmental management Systems i.e. ISO 14001:2004 (EMS). Periodic internal audits are done by qualified auditors and yearly surveillance audits are also carried out by external agencies. All operations are preceded by stringent procedures of environment impact assessments. Extensive Green Belt has been developed at all locations across the country to mitigate pollutants and to mitigate noise & odour. At GAIL Petrochemical Plant, a good acreage of our land is covered by water bodies and green belt attracting rare species of flora & fauna. Effort is under progress to have a sewage treatment plant(STP) whose effluents have parameters that would be suitable for horticultural works such as irrigation of lawns. The technology chosen for this purpose was MBR (Membrane Bioreactor).The quality of water is much superior to any other technology and ensures removal of coliform and other pathogens to a large extent thus reducing the requirement of disinfection. The efficient sewage treatment process ensures an odourless and clean environment as well as improved quality of treated water which adds to the hygiene level. The benefit to have a MBR based STP was that the entire effluent was useable and there was zero wastage of sewage water.US-EPA, an international agency, conducted site survey for identification and quantification methane fugitive emissions. At GAIL's process plants, hazardous solid waste is stored and disposed off as per the best available environment practices. The solid wastes in the GAIL plants are collected, stored and handled in a manner that has no detrimental effects on the ground water or any other part of the environment.

Mangalore Refinery and Petrochemicals Ltd.(MRPL) : It is an ONGC group company and PSU in India. In Environment Management, the Company's Philosophy is to perform beyond Compliance - that is to perform better than minimum required by statutes. The refinery is certified with ISO 14001: 2004 for Environment Management Systems. MRPL is exploring potential value added projects and systems for sustainable development. The focus remains towards value added projects, reduction in Energy consumption, to adopt new technologies and yield improvement in projects. Environment efforts mentioned are advanced Waste Water

Treatment, oil effluent treatment unit & Sequential Batch Reactor (SBR) commissioning, membrane Bio Reactor (MBR) unit pre commissioning, sulphur Pastillation Unit being commissioned in the Refinery to reduce dust emissions in the Sulphur Recovery Unit (SRU),advanced Reverse Osmosis (RO)Plant set up for maximizing the quantity of treated effluent back to the Refinery, Wet Air Oxidation (WAO) Unit is set-up in the refinery to treat Spent Caustic and to improve the WWTP(Waste Water Treatment Plant) performance, reduction in fresh water consumption, Bioremediation Unit, VOC Emission monitoring and minimization, periodic Environment Awareness programs organized in the neighbouring villages & schools in association with Karnataka State Pollution Control Board (KSPCB),Tree Plantation in the Refinery for developing green belt, advanced technology for cleaning Crude Tanks in the refinery, Seawater quality monitoring indicating no adverse effect on the marine environment, Ground Water monitoring stations in and around Refinery for ground water quality check, Average treated effluent recycled to cooling towers during the year, Ambient air quality monitoring inside and outside the Refinery as per revised National Ambient Air Quality Monitoring Standard, Vapour Recovering System, VOC Recovery system, Hydrocarbon detector at strategic locations, Installation of automatic rim seal protection, LPG spheres and Moulded Bullets PSV discharge to flare header etc.

Reliance Industries Ltd.(RIL): It is a leading private sector in India with fully integrated company with operations spanning exploration and production of oil and gas, petroleum refining and marketing, petrochemicals (polyester, fibre intermediates, plastics and chemicals), textiles, retail and telecommunication, being India's largest private sector conglomerate and a Fortune Global 500 company and are the largest producer of polyester fibre and yarn, having the largest refining capacity at any single location with the turnover of 3397.92 billion and net profit achieved for 2011-12 was INR 200.40 billion.

All manufacturing divisions and upstream business have instituted ISO 14001: 2004 Environmental Management Systems (EMS). British Safety Council have conducted Five Star Environmental Audits and all manufacturing divisions have been covered under this audit. Measures have been taken towards environment preservation such as mangrove plantation in the coastal areas, creation and maintenance of green belts and gardens in and around the manufacturing divisions, vermi-compost of waste, recycling of treated water in cooling water system and in horticulture activities. GHG management forms an integral part of annual plans .As energy forms a core part of strategy, focus is made towards energy conservation and energy audits are carried out at all the manufacturing divisions to critically identify opportunities both in the area of energy conservation and energy efficiency. Reliance Energy Management System (REMS) at group level has been launched to further energy conservation and efficiency agenda. Process designs are made to reduce air emissions on a continuous basis resulting in reduction of suspended particulate matter(SPM),oxides of suphur, nitrogen, volatile organic compound. Compliance management system in place undertakes an impact analysis and risk analysis study of potential projects prior to commissioning. Environmental impact and risk assessment of all new proposed projects are conducted to ensure adequate measures are implemented to protect environment and preserve biodiversity of the region.RIL has forayed into wind and solar energy as an alternative fuel.

Environmental Stewardship states to strive to inculcate the responsibility of environmental preservation and management in employees and other stakeholder groups, having a framework for addressing environmental issues across operations with clear goals and targets by adhering standards on environment through regular audits and training to achieve environmental excellence. RIL is a major consumer of packaging materials for its Polyester & Polymer business. Major raw materials for these packaging materials are paper and plastic. To mitigate its impact on the environment, the company emphasise on the 3 R's (Reduce, Reuse, Recycle) for packaging procurement. Various initiatives like reduction in consumption by optimizing specification and alternate product development, reusing of Packaging material, recycling of wastes and used as packaging material.

Resource Productivity has been enhanced by optimizing resource consumption and backward integration has helped to achieve a superior productivity. The focus is on increasing the share of recycled materials in production processes and converting non-product outputs into inputs.

Water Conservation has been made by ensuring that none of operations consume more than 5% of the annual average volume of the water source by volume. Reduction has been targeted for total amount of hydrocarbon discharged in the wastewater stream at manufacturing operations and the specific water consumption at E&P(Exploration & Production)operations in addition to tapping and utilising rainwater at most of our manufacturing operations thereby reducing dependence on surface and ground water and increased recycled water percentage over previous year.

Biodiversity Preservation is done through various initiatives for preservation of biodiversity such as plantation and maintenance of mangroves in the coastal areas through a unique partnership with Ministry of Environment and Forests, Government of India and Gujarat Ecological Commission by setting up the National Centre for Marine Biodiversity (NCMB) - India's first Centre of Excellence for the study of India's coastal biodiversity at Jamnagar.

Waste to Bio-manure at Naroda : At Effluent Treatment Plant (ETP), Naroda manufacturing unit, the entire industrial waste was converted into manure through vermi composting, significantly reducing the waste discharged from the plant. The manure produced was used in the orchards and lawns within premises which has enabled to limit the use of chemical fertilizer and has also helped to detoxify the soil and the plants.

Waste Minimization is done through environmentally sound practices for waste management at all our operations by reducing waste generation at the source by maximising recycle and reuse the waste generated and the remaining waste is sent to a secured landfill or is incinerated as per regulatory requirements. Efforts are being made to meet statutory norms and strive to minimize the amount of effluent discharged, air emissions and spills.

Petrochemical business has been certified for Responsible Care(RC)14001and to fulfil extended producer responsibility it is ensured that all raw materials are transported in a secure manner within our supply chain framework, in order to ensure the safety of our customers, carriers, suppliers, distributors and contractors. Since its inception in 2008-09, SEZ refinery at Jamnagar has been capable of producing and meeting customers' need for Euro V equivalent fuel which is ahead of the requirements for the Indian market.

RIL has put up one of India's finest recycling plants to process PET bottles, which recycles about 2.5 billion bottles annually preventing them from ending up in a landfill. On a large scale, RIL work closely with Indian Centre for Plastics in the Environment (ICPE) on a voluntary basis lending technical and financial support to help the organization plan and implement.

The RIL Sustainability Report for FY 2011-12 is a GRI Checked Application Level A+ Report, has been independently assured by KPMG, India and complies United Nations Global Compact (UNGC). The report is aligned to The National Voluntary Guidelines for Social, Environmental and Economic Responsibilities released by Ministry of Corporate Affairs, Government of India.

5.1. Initiatives taken in India by Hindustan Unilever Ltd.(HUL)and Procter & Gamble(P&G), leading global detergent manufacturers

Detergent manufacturers are using LAB (Linear Alkyl Benzene), a key active petrochemicals in their formulation. In one of the initiatives P&G came out with the detergent that works effectively at low temperature resulted in lot of energy saving per washing cycle. We have to see which part of the product life gives more saving which makes economic sense and thereby interests customers value for money. Detergent manufacturers changed from conventional mode of transporting washing detergent in cardboard boxes to foils thereby reducing logistic expenses and emission as number of wash loads per transmission reduces drastically. Other initiative is to concentrate product before delivery. Reduction in volumes through the way of packaging helps to save space it takes at any point of time during product life cycle. Bulk transportation of concentrated product and distributing at the point of sale based on the feasibility can save lot of energy and carbon dioxide emission. Optimising the container design helps in the same way. P&G took initiative for reduction of water consumption so as to enable faster rinsing of the washing detergent.

P&G : Globally one of the biggest soaps and detergent manufacturer and marketer with focus for Indian market. Their global turnover is $82559 million with net earning of $11797 in 2011. They have set specific strategies and goals to ensure delivering continuous improvement toward each of the focus areas-Products, operations and social responsibility. Out of the three focus areas, environment responsiveness has been captured in two of them i.e. product and operation by engaging their employees and stakeholders.

Leadership Statement released by Vice President, Global Sustainability states that products have at least a 10% improvement in their environmental profile compared to a previous or alternative version of that product. In operations, they have achieved a reduction per unit of production of 16% in energy, 57% in waste, 12% in CO2, and 22% in water usage. Goal of 2012 was a 20% reduction in each of these areas. P&G announced a new long-term environmental sustainability vision. P&G also announced a series of additional 2020 goals, focused on Products and Operations. Solid waste continues to be an important issue and the same is being addressed through comprehensive solid waste strategy which includes creating less solid waste by designing waste out of packaging and products, driving the waste generated at manufacturing facilities that goes to landfill to zero, and working

with governments and industry partners to catalyze the development of waste management systems that divert solid waste from landfills or dumps to recycling and incineration with energy recovery systems.

Operations Goals are stated as to deliver an additional 20% reduction (per unit of production)in energy consumption,CO_2 emissions, disposed waste, and water consumption from P&G facilities leading to a total reduction over the decade at least 50%.

To make product more environmentally sustainable, they analyse its footprint throughout its entire lifecycle and replace petroleum based raw material to sustainably sourced renewable raw material. Sustainable innovation products have significantly reduced carbon footprint versus a previous or alternative version of the product without negatively impacting the overall sustainability profile of the product.

Highly productive plant like sugarcane could be a sustainable feedstock for producing next-generation renewable plastic containers which used as a packaging bottle for P&G's Pantene Pro-V brand shampoo. Plant based plastic is a significant environmental innovation. When compared with petroleum based HDPE(High density Polyethylene), it reduces GHG emission, consumes less fossil fuel, can also be recycled, and committed to packaging reduction resulting in reduction in plastic consumption.

Commitment to Compaction is accomplished by creating a triple win for customers, retailers and the planet and is achieved by liquid laundry compaction and advances in powder compaction provides meaningful benefits for the consumer, the retailer, and the environment. The compacted powder formulas of detergents like Tide etc. use a higher proportion of dense active cleaning agents, resulting in the same great performance using less product. The environment benefits from a smaller carton size that produces less waste. The retailer benefits because fewer trucks, fewer pallets, and less inventory space allow for a more efficient supply chain.

To maintain environmental Quality and to reduce manufacturing waste by transforming waste into alternative products, P&G employs a dedicated global team of experts. The GARP team (Global Asset Recovery Purchases) has expertise in creating value from waste. Sixteen P&G plants and distribution centres have achieved zero manufacturing waste sent to landfill. This means that 100% of their manufacturing waste is beneficially re-used and diverted from landfills.

HUL : Organisation is the biggest soaps and detergent player in India with net revenue of 25,810 crores and profit of 3,797 crores. For the period of last 20 years actions taken for sustainable business by HUL has been captured sequentially in 2011 report. Sustainable living plan 2010 speaks in clear terms the target to make halve the environmental footprint of the products and to source 100% of agricultural raw materials sustainably. Efforts include eco-efficiency program, linking progress with reward, building sustainability to innovation, appointing sustainability champions to cover every function, reduction in packaging. Highlights have been made on what has been done and further what needs to be done. Environmental target set to achieve by 2020 is to halve the environmental footprint, halve the water use and waste associated with consumer products, source 100% of agricultural raw material sustainably. Report exhibits-achieved, on plan, off-plan and missed target of 2011 in clear terms. Focussed actions are made to mitigate or reduce footprint on greenhouse gas emission, water and waste reduction, after identifying which segment matters most.

The Unilever Sustainable Development Group (USDG) comprises external experts who provide advice and guidance on the development of strategy. HUL performance against the Global Reporting Initiative's (GRI) G3 guidelines has been self-assessed as a B+ reporter according to GRI-defined application levels for 2012 and is a signatory to the UN Global Compact principles by providing an annual update in Communication on Progress on how they are living out the Compact's ten principles on human rights, labour, environment and anti-corruption in business operations.

6. Initiatives by major Petroleum and petrochemical Industries outside India

Shell Global: The sustainability report states that **"**Shell is a global group of energy and petrochemical companies employing 87,000 people in more than 70 countries with an aim is to help meet the energy needs of society in ways that are economically, environmentally and socially responsible." Sustainable Report of 2012 on Environment states : "As we work to help meet the world's growing energy needs, we aim to reduce the environmental impact of our operations. Working with local communities and experts from leading environmental organisations helps us better understand and address the challenges we face in running our facilities and developing major projects."

Shell produces more natural gas, the cleanest-burning fossil fuel; helping to develop technologies to capture and store CO_2; producing low-carbon bio-fuel.

Performance has been depicted clearly year wise for the period 2003-2012 on Greenhouse gas emissions, Flaring, Energy efficiency, Acid gases and volatile organic compound, Ozone depleting emission, Spills and discharges and Water. Failures are also projected along with the improvements.

External Review Committee to assess its sustainability reporting is in place for last eight years. Reporting began voluntarily on environmental and social performance with the first Shell Report of 1997. It provides regular information to the Carbon Disclosure Project, Dow Jones Sustainability Index, FTSE4Good Index and other organisations that assess the economic, environmental and social performance of companies.

Internal controls such as audit trails and statistical checks help assure the accuracy of the Shell Sustainability Report. The External Review Committee of independent experts helps make sure that reporting is balanced, relevant and responsive to stakeholders' interests. Lloyd's Register Quality Assurance Ltd has provided limited assurance of direct and indirect greenhouse gas emissions data for 2012.

Report is in accordance with the Global Reporting Initiative (GRI) and in line with the oil and gas industry guidelines developed by the International Petroleum Industry Environmental Conservation Association (IPIECA), the American Petroleum Institute (API) and the International Association of Oil & Gas Producers (OGP). GRI confirmed A+ reporting level for the information contained in this Sustainability Report. Shell supports the UN Global Compact and its 10 principles covering human rights, labour, environment and anti-corruption.

SINOPEC : China Petroleum and Chemical Corporation (hereinafter referred to as "Sinopec Corp." or "the Company") is an integrated energy and chemical company with principal businesses of exploration, development, production and trading of petroleum and natural gas; refining, marketing and distribution of petroleum products, as well as production and marketing of chemicals. Sinopec is the largest producer and distributor of chemical products in China. In 2011, total turnover has grown by 31% to RMB 2.5057 trillion and Net profits attributable to the Parent grew by 1.4% to RMB 7.17 billion. With its unique integrated upstream and downstream businesses along the oil and gas value chain, Sinopec is the largest refiner in China and the second largest in the world.

Green development is one of the important dimensions of company's core competitiveness. SINOPEC has officially made green and low carbon growth one of its corporate strategies. Emphasis are made on green operations. Clean production statistics has been captured during 2005-2011in terms of clean production plants, investment deployed, waste water reduction, COD in waste water, waste gas reduction,SO_2 reduction in waste gas, industrial residue reduction. Oil and gas E&P(Exploration and production) and pipeline construction may impact the ecology and environment. Sinopec pays high attention to eco-environment restoration in areas around abandoned wells and along the pipelines, and tries to keep the impact at the minimum level. Holding a highly responsible attitude, Sinopec Oilfield is devoted to a balance between land development and environmental protection. By means of advanced and environment-friendly drilling technologies and land rehabilitation technologies, there is less pollution caused to the soil in surface operations, and rehabilitation is timely made to the contaminated land. With strong awareness to preserve the environment, every employee is committed to green development.

Efforts are captured on making Clean Products-natural gas and its marketing and reducing pollution in consumption, expanding bio-ethanol consumption in gasoline, bio-diesel marketing, wastes treatment improvement and meeting emission/discharge target, clean production and pollution reduction from the source, developing Circular Economy by turning Waste to Worth, more efforts to protect and restore ecology, industrial restructuring and more efficient use of energy resources, saving energy and cutting CO_2 emission, developing Low-Carbon Energy and optimizing energy structure, more efforts in R&D to fight against the Climate Change, Low-Carbon Lifestyle. Organisation has diversified the Energy Mix and placed emphasis on the development and utilization of new types of energy, including the development of unconventional hydrocarbon resources (CBM, shale gas and shale oil etc.) and biomass energy (bio-diesel and bio-jet fuel) and the clean utilization of coal. On the one hand, Sinopec refineries and rubber plants imported environment-friendly rubber process oil from international market and carried out industrial production tests of rubber process oil. On the other hand, production, marketing and R&D are well integrated and coordinated to make breakthroughs in environment-friendly aromatic oil processes and industrial production. Objective is to enhance ability of low-carbon growth by reinforcing mid-term and long-term strategic low-carbon technology preparation, to focus on R&D of technologies that help with energy saving and efficiency improvement, development of renewable and alternative energy sources, emission control, treatment and utilization of GHG like CO_2 and CH_4, biological and engineering carbon sequestration, clean and efficient development and utilization of coal, oil and natural gas,CO_2

capturing and sequestration, CO_2 flooding, comprehensive utilization of high purity CO2 and fuel production via microalgal CO2 fixation. Sinopec only purchase materials and equipments in conformity with green, energy-saving and low-carbon standards. In this way, organisation is trying to lead its suppliers and contractors on the right track of green and low-carbon growth. Sinopec's World-Leading CO_2 Capturing Technologies account for 90% of the market shares in China. They have succeeded in test of CO_2 usage in enhanced oil recovery (EOR).

Sustainability Report 2011 follows the four reporting principles of Global Reporting Initiative's (GRI) G3 Guidelines. The Company supports and implements the advocacy and conventions by UN Global Compact (UNGC) since signing up with UNGC in 2004.The report has been third party(CSR Research Center of Economics Division of Chinese Academy of Social Sciences) assessed, discloses negative information and controversial issues and, therefore, bears considerable balance. However, it has to improve the comparability by disclosing more comparative indicators for several consecutive years.

Petrochina : PetroChina Company Limited (PetroChina) was established in 1995, under the restructuring of China National Petroleum Corporation (CNPC). PetroChina is engaged in a broad range of businesses in relation to oil and natural gas exploration, development and production of crude oil and natural gas, refining, sales and marketing of crude oil and refined products, the production , sales and marketing of primary petrochemical products, extended chemical products with a turnover of 20,038 RMB(*10^8)and a net profit 1,330 RMB(*10^8) in 2011 and ranked 2nd among Fortune 500 China.

PetroChina's green energy effort include accelerating the development of natural gas from exploration and development, pipeline storage and transportation, to marketing and downstream utilization, construction of gas transportation infrastructure and increase gas imports, develop nonconventional natural gas by boosting mass exploration of coal bed methane, exploration and cooperation in shale gas, and launching tight gas evaluation, promoting the research and development of biomass fuels such as fuel ethanol and aviation bio-kerosene, building gas pipeline network and providing clean energy and improving atmospheric environment. With the full operation, the Second West-East Gas Pipeline will accelerate the improvement of energy mix of the 15 provinces along the pipeline, increasing the proportion of natural gas in China's primary energy consumption by 1~2 percentage points. Using natural gas would not only bring convenience to people's lives, but also improve the environment. Experts estimate that, every year, 30 billion cubic meters of natural gas imported from Central Asia could replace 76.8 million tons of coal, reduce CO_2 emissions by 130 million tons, and cut hazardous substance emissions – including sulphur dioxide, nitrogen oxides and industrial dust – by 2.46 million tons.

As conventional, easy-to-tap and superior oil and gas resources are depleting, unconventional energy such as CBM, shale gas and tight gas has become the most realistic choice to supplement supplies of conventional energy. With a view to future energy supplies, Petrochina strengthened the development and utilization of unconventional hydrocarbon resources and renewable energies so as to promote sustainable economic and social development. Committed to the concept of "prioritizing environmental protection and putting safe production first", organisation promoted the development and utilization of technologies related to energy and emissions reduction and optimal energy integration. In 2011, they have developed and implemented the "Pollution and Emission Reduction Implementation Plan during the 12th Five-Year Plan to fulfil emission targets. Great importance is given to minimize environmental impacts in the whole process of operations. In 2011, Petrochina organized and carried out three-tier water pollution prevention and control inspection, and identified environmental risks near rivers and environmentally sensitive areas. Monitoring has been done to reduce emission of COD and SO_2. The company established an energy consumption analysis evaluation system and energy consumption warning mechanism, and adhered to daily analysis of primary energy consumption, weekly estimation of energy and water conservation progress, as well as a monthly summary of energy and water saving achievements to analyze energy-saving measures and effects before taking any improvement measures. Continuous effort is being made for optimizing energy system structure and strengthening energy-saving technology utilization. As one of its efforts to protect the environment, Company tries its best to minimize the occupation of arable land and to restore land to agriculture use. Petrochina actively support the policies and actions taken by China to address climate change and take the initiative to reduce carbon emissions and sequestrate carbon to contribute to the mitigation of global climate change. Reduction of Carbon Emissions are achieved by constantly integrating and optimizing resources, eliminating inefficient and high energy-consuming equipment and processes, and increasing circulation of waste energy resulting in clean production and use wind and solar power in operation in areas where the conditions permit. Emphasis on Environment-friendly Products are achieved by developing natural gas and by strengthening the exploration and development of natural gas reserves, and driving the increase of storage with technology innovation.

The sustainability report 2011 is formulated according to the principles of accuracy, standardization and transparency and referred to the Guideline on Preparing the Report on Performance of Corporate Social Responsibility by the Shanghai Stock Exchange and had consulted the Sustainability Reporting Guideline released by the Global Reporting Initiative and the Oil and Gas Industry Guidance on Voluntary Sustainability co-published by the International Petroleum Industry Environmental Conservation Association and the American Petroleum Institute and had also participated in the United Nations Global Compact (UNGC).

7. Data Sources

Secondary data has been obtained through Company websites and in house information .The detailed study is carried out at Indian Oil as all the information could be clarified through face to face interview with concerned officials. Information are also captured through face to face meeting with P&G and HUL officials.

Archival documents: Data has been taken from published sources, WEBSITES, company accounts, annual reports, and corporate environmental reports. A case study of each firm included archival information on the firm's ecologically responsive activities, financial performance, and ecological impacts. This information served to confirm the reliability of the interviewees' responses and permitted more directed and detailed probing in the interviews in Indian Oil. Work has been made on the archival documents because sufficient datas were available specifying the objective and the outcomes.

8. Limitations

Firm-level improvements do not automatically imply aggregate national-level improvements in industries. In this report major organisations in India has been considered which gives the broad direction in the field of environment responsiveness in India and relative position with respect to selective global Petroleum and petrochemical organisations. However, more medium and smaller organisations can be included in the further research to get more clarity towards environmental approach in the overall industry. This study has some limitations. With regard to data collection, the evaluation of implementation levels of environmental parameters is made by means of information on websites and environmental/sustainability reports, which could seem to have an element of public image building rather than factual truth. Nevertheless, data in companies' websites and reports can be considered affordable, due to the particular samples, being mainly made up by large PSUs, Private and multinational companies, whose reports are generally reviewed by third parties. Further research could be devoted to use primary data sources, by means for example of direct interviews, or surveys. The companies included in this study are large and internationally operating ones. Thus, results obtained cannot be generalized to SMEs. Further research could be made with these companies to see to what extent green efforts are being made and applicable.

Moreover, further study could be devoted to investigate the outcomes of green efforts with respect to other parameters for being green and competitive. Finally, the use of longitudinal data would be useful to investigate how the behaviour of companies dynamically changes over time considering the coming into effect of stricter environmental regulation schemes such as Kyoto Protocol, the REACH directive for chemical substances etc.

9. Conclusions

This study contributes to increase our understanding on the environmental strategies adopted by Indian domestic petroleum and petrochemical industries and implementation thereof. In terms of managerial implications, this study highlights that green approach and development cannot be conceived as a standing alone practice within companies, but it needs to be supported by environmental strategies, and provides directions to companies in terms of strategies to invest in order to be competitive in global market.

Companies and their sustainability is intertwined with social, economic and environmental front. As the green technology sector grows, the need for professionals will increase. Pooling and managing human resources efficiently will be essential. Strengthening and building a strong global brand as an organisation will give edge over others. Companies must equally capable of producing products in a greener manner and at the same time communicate the sustainability value to its stakeholders. Building sustainability into business is a challenge now and for future. Associating environmental sustainability with the perceived value of a product is important. It is in companies' own interests to adopt environmentally responsible behaviour and business efficiencies arising out of the same will deliver a change in quality of economic growth which is sustainable. Simultaneous commercial and economic gains are possible. Cooperation and not confrontation between business and its stakeholders is mutually beneficial. Business function should encourage the greening of business, as companies pay greater attention to their own Environmental impacts and draw more positive correlation with environmental campaigns(Enmarch-Williams,1996).Focus should remain upon the overall condition of the environment rather

than performance of the individual component of the economy and regulatory compliance. We have to understand that if output grows faster than the eco-efficiency gain, the condition of environment will deteriorate. Indian Petrochemical organisations should focus on reporting excellence, long-term focus and going beyond compliance with codes, taking proactive steps. They have to improve the comparability by disclosing more comparative indicators for several consecutive years, to improve the completeness by disclosing more indicators, by improvement of report in terms of considerable balance for reporting of both positive and negative aspects in clear terms. Overall rating is to be incorporated by the external rating team in the relevant field.

The concept of green and low-carbon growth is to be deeply rooted in all Indian domestic Petroleum and petrochemical organisations. To be environment friendly organisations should have low-carbon-orientation as an ultimate goal. This responsibility is the key to balanced and sustainable development. It is sound environment management that can win new competitive edges and customers' trust, and secure a sustainable development in a complex, competitive and changing world. Govt. of India should formulate updated policy on alternate renewable energy sources and bio-fuels. In the similar line, Indian petrochemical industries should focus more on alternate renewable sources and green fuels. The initial investment may be more but the long term benefit will benefit both organisation and society. Organisation should focus more on implementation of policy and target. The blending percentage of bio-fuel should be increased in normal fuel and focussed effort should be made on that and continuous updating of policy by Govt. of India in consultation with Indian petroleum and petrochemical industries are required. Effort should be made more on green production technology, process and products. Organisations need to evolve policy for green supplier and green packing and recycling. External auditing should be in place with periodic interval to keep an eye on target against achievement in line with Govt. policy framework.

Environmental sustainability is one of the most important global challenges of the 21st century. According to renowned climate scientist James Hansen: “Our global climate is nearing tipping points. Changes are beginning to appear, and there is a potential for rapid changes with effects that would be irreversible—if we do not rapidly slow fossil fuel emissions during the next few decades.” The body of peer reviewed climate science studies is unequivocal: anthropogenic climate change is a reality. In the absence of expeditious action to decrease greenhouse gas emissions, the prognosis for many on planet earth due to lethal planetary overheating is grim. By virtue of their dominance in the global economy, business organizations play a critical role in mitigating climate change and promoting environmental sustainability. Organizations pursue environmental sustainability by informing stakeholders of the need to make changes to business as usual, by motivating them to take actions to achieve environmental objectives, and by assessing the impact of such actions on economic and environmental performance. General observation is that domestic regulation is a primary driver of developing-country firm environmental behaviour (Carrere 2002; Latorre 1999; Mercado 2000; O’Rourke 2003; Pratt and Fintel 2002).This is obvious from the sustainability reports of petrochemical organisations in India. Organisations in India should work proactively by going beyond Government MoU and statutory regulations.

While environmental enforcement of regulation can be lacking, there are numerous examples of government-sponsored environmental initiatives. Potential domestic driver of firm greening is market pressure. Increased cross-border market, regulatory, and ideational integration has created some upward pressures on developing-country firm environmental behaviour. Export orientation is hypothesized to ameliorate developing-country firm environmental performance. Economic integration through increases in foreign direct investment and trade liberalization, can be a direct driver of firm greening via the transfer of clean technologies. Transnational market dynamics, international regulation is one of the potential driver of developing-country firm greening. Of late, the Kyoto Protocol established the Clean Development Mechanism (CDM), a market mechanism by which developing country firms sell credits earned for greenhouse gas emissions reduction projects to governments and firms in industrialized countries (Chandler et al. 2002). The international flow of environmental norms is one of the transnational driver of developing-country firm greening. Example for international diffusion of voluntary codes of environmental conduct are the Chemical Manufacturers Association Responsible Care program and the International Organization for Standardization’s 14000 environmental management series (Nash and Ehrenfeld 1997). Domestic Indian companies to identify climate change as a key corporate strategy issue, to scan the international arena for global best climate practices and tailor it to national situation after selecting a template and should promote it to constituencies within and outside the organisation. Eco-certification in farms, leads to tangible improvements in farm-level environmental risk management. Perkins in his article on corporate environmentalism in India argues that growing political, market, and social integration have led to the globalization of corporate environmentalism. Domestic regulatory policy enhances firm environmental entrepreneurialism in India. Long term Target is to be spelt out for environment responsive factors and year wise

how the same will be achieved needs to be spelt out in the sustainability reports. Though, there is mention of undertaking different environmental factors, however, Indian petrochemical Organisations reports do not speak out in objective terms as elaborated in table 2 .

Design of products and processes for environmental compatibility should be made on the basis of life-cycle analysis, alternative manufacturing processes, efficient separation technologies so as to minimise or eliminate un-mixing of materials after mixing in the process resulting in saving in energy. More focus should be given to accommodate recycling and reuse of products. Regulations introduced should not come as a barrier for promoting adoption of environmental principles along with economic incentive. The overall approach should be broadened through dialogue and involvement of intra-Organisations and Organisation with governments, academic institutions, environmental and citizen organisations. Research should emphasise on new product development and improved catalytic reaction so as to achieve better yields and environment friendly product. More study should be conducted to find final output that is economically recoverable or dischargeable to the environment. Organisations in India should be more proactive in restoration of contaminated sites. Renewable energy sources like solar energy, wind energy, biomass are the leading options. More efforts should be diverted in these areas which will help to reduce GHG emission and thereby global warming. Effort to be made for hydrogen-energy cycles, because of their potential as an efficient and clean carrier for distribution of energy to users. At the end, Environmental management should be transformed from problem solving, compliance oriented, emission reduction beyond compliance, source reduction to the Green Company orientation approach. In the long run, many markets are likely to be shaped by environmental factors resulting from changing cost structures due to eco-taxes and related developments. This threatens some existing products and services and creates new opportunities(Fussler with James,1996;Porter and van der Linde,1995).Indian Petrochemical organisation must have better understanding of medium to long term environmental costs and benefits can help to neutralise threats and ensure opportunities. Indian petrochemical industries improve more on environmental value analysis-calculations can be made of value added per tonne of emission or per tonne of environmental impact. These give a rough measure of how efficiently organisations are using environmental resources. This also measures organisation's sustainability. A final point is the progressive internalisation of externalities or the broader requirements of sustainable development can be difficult to integrate into management activities that normally focus on routine operational issues. Hence, keeping an eye to long term perspective, the adoption of environment-related management accounting is likely to be outstanding activity rather than an ordinary activity and one that will require financially astute environmental managers or environmentally aware accountants, to drive it in Indian Petrochemical Industries.

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Table 1.The model developed by Solomon(1974)

Analysis of Social Performance			
Statement of Social Income			
Value generated by the productive process	xxx		
Add unappropriable benefits		xxx	
Less external costs imposed on the community		xxx	
Net Social profit/loss			xxx

Net Social profit/loss arrived in financial terms

Table 2. Keywords for each environmental strategy: A comparative status

	IOC	GAIL	MRPL	RIL	HUL	P&G	SINOPEC	Petrochina	SHELL
Environmental Management System	Y	Y	Y	Y	Y	Y	Y	Y	Y
ISO 14001	Y	Y	Y	Y			Y	Y	
Member of the UN Global Compact	Y	Y	Y	Y	Y	Y	Y	Y	Y
EMAS					Y	Y	Y	Y	Y
Process eco-innovation	Y	Y		Y	Y	Y	Y	Y	Y
Water use reduction	Y	Y	Y	Y	Y	Y	Y	Y	Y
Material use reduction	Y	Y	Y	Y	Y	Y	Y	Y	Y
Resources use reduction	Y	Y	Y	Y	Y	Y	Y	Y	Y
Production waste recycling	Y	Y	Y	Y	Y	Y	Y	Y	Y
Renewable energy	Y	Y		Y	Y	Y	Y	Y	Y
Energy use reduction	Y	Y	Y	Y	Y	Y	Y	Y	Y
Energy efficiency	Y	Y	Y	Y	Y	Y	Y	Y	Y
Energy management system	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reduction of GHG emissions	Y	Y	Y	Y	Y	Y	Y	Y	Y
carbon capture and storage							Y	Y	Y
Environmental standard of suppliers					Y	Y	Y	Y	Y
End-of-life products recovery				Y	Y	Y	Y	Y	
Packaging recovery				Y	Y	Y			
Supplier green standard					Y	Y	Y	Y	Y
Green supplier					Y	Y	Y	Y	Y
Environmental information sharing with suppliers				Y	Y	Y	Y	Y	Y
Green product	Y		Y	Y	Y	Y	Y	Y	Y
Sustainable product	Y	Y		Y	Y	Y	Y	Y	Y
Eco-product	Y			Y	Y	Y	Y	Y	Y
Environmentally friendly product	Y			Y	Y	Y	Y	Y	Y
Green packaging					Y	Y			
Sustainable design		Y		Y	Y	Y	Y	Y	Y
Eco-design		Y			Y	Y	Y	Y	Y
Design for Environment	Y	Y	Y		Y	Y	Y	Y	Y
Product eco-innovation	Y			Y	Y	Y	Y	Y	Y
Life Cycle Assessment		Y		Y	Y	Y	Y	Y	Y
Eco-label					Y	Y			
External Review Committee					Y	Y			Y
Sustainable development linked to					Y	Y			Y

annual incentive									
Carbon disclosure project	Y				Y	Y			Y
Dow Jones Sustainability Index					Y	Y			Y
Third party assurance of GHG emission data									Y
Global Reporting Initiative	Y	Y		Y	Y	Y	Y	Y	Y
Eco-restoration of sites							Y		

Source : authors' compilation. Y indicates organisations are working on it; degree may vary. Keywords are traced based on organisation reports.