



Green Management and Green Technology

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The study examines Green Management and Green Technology which demystify certain terms like "Carbon Credits" and "Carbon Footprints". The biggest resistance to going green comes from certain preconceived notions like "Going Green is Expensive". Going Green seems to be modern buzzword around because it is mostly the upper ladder of the society. The centuries ago, this would seem absurd because we are given to believe that it is only recently that we began to concern ourselves we matters of general benefit, such as betterment of earth. As early in 14 century, the importance of keeping a leash on the amount of resources we burn. Some of events also contributed to the consciousness on environmental awareness and laid the roots for today ideas of "Green Living". The Government has put in place certain laws to help save the environment. The challenge we face today is ensuring that we strike a balance between the cost on the environment and the progress or lifestyle improvements mankind craves. Today, we find that everyone from larger corporations to political bodies are all jumping on the green bandwagon, the reason for that is apart from making social sense it also makes financial sense to the companies. The key findings from the empirical analysis are: (1) Goals to make Green Technology prosper (2) Controversy about carbon credits (3) Formulation of major policies in 100years global warming potential (4) Myths about Going green (5) Government green policy (6) Green tech initiatives (7) Chronology of the green movement.

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INTRODUCTION

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More rapid green growth is inconceivable without innovation. Frontier innovations shift out production possibilities, allowing the production of more output and newer and more environment-friendly outputs with fewer or different inputs. We are surrounded by technology and it has encompassed almost all aspects of our lives. A lot of technology, which has made our lives easier, has not been charitable towards the environment. This is where green technology steps in and helps us in some way to protect our environment. Green technology is the branch of technology that involves the development and application of products, equipment and systems that help in conserving the natural environment. Green technology also tends to minimise and reduce the negative impact caused by human activities such as manufacturing or disposing of gadgets.

Factors of Green Technology

The parameters, which should be fulfilled for green technology, are:

(a) **Renewal Energy:** Sustainability is one of the main aspects which define green tech. Many of the current sources of energy are non-renewable. We consume coal, oil, petrol and other fossil fuels and it is not uncommon to see that the prices of these commodities are increasing with every passing day, and they will continue to increase till an alternative is not found.

Another disadvantage of these fuels is that their extraction leads to massive air pollution which in effect and may lead to global warming. Using renewable sources of energy such as sunlight, wind, water, to generate energy is the only alternative to traditional fossil fuels. Using solar cells, wind turbines, hydroelectricity, not only keeps the environment clean, but also helps us to reduce our dependence on fossil fuels, making us self-sufficient.

(b) **Reuse and Recycle:** Products should be manufactured in such a way that they can be recycled or re-used after their lifetime. For instance, cell phone that will not be lasting for a long lifetime, but when it comes to disposing; each component that is being used to make a cell phone can be reused to make something else.

(c) **Optimising manufacturing process:** It involves a lot of wastage and lead to environmental problem i.e. pollution. How to optimise the process is up to individual company, but if manufacturers formulate green policies and implement them in their manufacturing processes, then it will lead to optimum use of resources.

Controversy about Carbon Credits

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As most industries rely on fossil fuels and are responsible for a great green amount of amount of green house gas emissions, the Intergovernmental Panel on Climate Change (IPCC) decided to come up with the practical solution to increase awareness about these gas emissions and make "Going Green" feasible for the industrialist - carbon credit. In the year 1997, as they signed the Kyoto protocol, they voluntarily decided to reduce the amount of carbon. A financially visible way out was the whole concept of carbon trading carbon credits. IPCC observed that giving a real price to carbon would give people a reason to invest in environmentally -friendly equipment that release lesser greenhouse gases. A carbon credit could be considered a license showing that the particular individual or company has paid to remove or reduce the emissions of CO₂ from the environment.

Playing the Carbon Trading Game

The policy formalized in the Kyoto Protocol, given in figure 1, can be viewed as profitable business venture owing to "carbon trading". Carbon trading is basically the buying and selling of Carbon Credits in the market under the allowances and the rules set as per Kyoto Protocol. Under this protocol, each country is given a quota of the amount of greenhouse gases they are allowed to emit, and in turn these countries set limits on the amount of green house gases run by their corresponding local operators. As per this policy, called the Clean Development Mechanism (CDM), big companies from developed countries that are exceeding their assigned quota of carbon credits can tie with another company and make it more environmentally friendly.

Calculate the Carbon Footprint

Carbon footprint is defined as "the amount of carbon dioxide or other carbon components emitted into the atmosphere by the activities of an individual, company, country, etc. This sums up the motive behind the formation of major policies in event 100-year global warming potential". There are two types of footprints i.e. Primary and Secondary footprints. The primary footprint is a measure of the direct CO₂ emissions due to burning of fossil fuels. Every product used by us produces the Secondary footprint.

By going online a user can check their carbon footprint. There are many free calculators available, for example, Footprintnetwork.org is dedicated to educating people on their carbon footprint. It

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supports specific nations. The calculator asks to select the country of residence and then calculates the corresponding carbon footprint based on the set of questions. The good thing of this site is after calculating the carbon footprint with the country it also tells ways to reduce footprint in a "do-able" manner.

MYTHS ABOUT GOING GREEN

Going green seems to be almost a no-brainer yet many desist from adopting more environmentally-friendly practices in everyday life. Still worse many believe going green might actually be detrimental to their everyday lives. Going Green not only make sense bur will actually beneficial co us, our surroundings and society at large. There are few myths and beliefs about going green. Most popular myth is that 'Green is Expensive'. This misconception arises out of a belief that in order to adopt a greener lifestyle, one needs to discard current one and buy newer, energy products. Many organizations including Tata Power have incorporated more ways to cut down on energy usage. One of the measures that can be followed is holding on to old appliances is a form of recycling. Most of the appliances are engineered with the intension of cutting down of wasteful energy expenditure and come with an energy 'star' rating - the more stars a produce has, the more money and energy we will save every year in using that product. Another little known practice that can effectively reduce the stress on our power grids is choosing the time of the day to perform daily energy consuming chores. The energy demand from power stations during the peak hours of the day tends to be much higher, and coping with additional power requirements during these hours can prove disastrous co the environment in the form of increased utilisation of coal.

Myths about Hybrid Vehicles

Hybrid vehicles are one of that use a combination of a conventional fuel engine and an electric motor, emerged as common answer to the fossil fuel guzzling cars. Some of the misconceptions that exist about these cars are:

- They "aren't powerful enough". Recent advances in electric motors by companies like "Lexus" and "Honda" have ensured that hybrid owners aren't left behind in the race.

- Many consumers mistake hybrid vehicles which pure electric vehicles. They assume that hybrid vehicles are a "hybrid" or a combination of the two technologies and use a technology called 'regenerative braking' The meaning of this is that car will run normally on conventional fuel.

Government Green Policy

The government has put in place certain laws to help save the environment. The 'Bottle Bills' of 70's and 80's began called 'Extended Product Responsibility (EPR) or also called 'Product Stewardship'. It started with the "Soft drink" and "Beer" manufacturing countries that had to take responsibility of their bottles and take them back to be reused or recycled. By adding the cost of the products to its entire lifecycle and beyond, product designers were forced to bring out products with easily reusable materials or degradable materials, which would ultimately make less of negative impact of the environment. The concept of EPR was first introduced in Sweden in 90's and "Wikipedia" defines it as "an environmental protection strategy to reach an environmental objective of a decreased total environmental impact of a product, by making the manufacturer of the product responsible for entire lifecycle of the product and especially for the take back, recycling and final disposal of the produce". The rising mound s of e-waste in landfills around the country the hazardous nature of most of such waste and International trends regarding management of e-waste brough about the Indian Government's Green Policy regarding such waste within the Ministry of Forest and Environment Act of June 2011.This Act came into effect from May 2012. The government published the draft rules for e-waste management in the Gazette of India under the Ministry for Environment and Forest in May 2011 inviting objectives and suggestions. The rules called the e-waste (Management and Handling), rules came in to effect from 1 May 2012. These rules apply to every producer, consumer, bulk consumer of electrical and electronics goods involved in the sale, manufacture, purchase and processing and also to the collection centre, dismantler and recycler of e-waste but not applicable to batteries, small and micro enterprises and radioactive waste. The rules also spell out the procedure seeking authorisation and registration for handling of e-waste."

GREEN TECH INITIATIVES

Moving away from fossil fuels enhances our endeavour for clean energy. A lot of multinational companies and superpowers are convinced that world's fossil fuels deposits are fast running dry, and a global energy crisis is looming on the horizon. Plenty of research on that front is going on around the world.

Green Initiatives Around the World

The looming energy crisis is a global problem. It will have repercussions for everyone around the world. Some initiatives around the world in this regard are as follows:

(a) **The Green Grid:** The Green Grid is non-profit organisation that stresses on IT companies to become more efficient. There are 175 member companies around the world, The Green Grid seeks to unite global industry efforts, create a common set of metrics and develop technical resources and educational tools to further its goals. In this participating IT companies work towards the shift to solar energy to minimise their carbon footprint and cause minimal harm to the ecosystem."

(b) **Google Initiatives:** Google is probably one of the most pro-active IT companies in the field of greener tech research, adoption and deployment. It is working on renewable energy and investing plenty of money in developing large-scale rooftop wind and solar panel installations, which can produce up to 1.7 GW of power, Google claims this. The company also has emails hosted on Gmail servers consume less energy than emails hosted on local server. "

(c) **Off-the-Grid:** This is an innovative American trend that's steadily evolving into a global movement. Off-the-Grid simply means not connected to the grid or conventional source of electricity or power. In 2006, USA had reported that close to 200,000 families living off-the-grid.

What's Happening in India?

India being a lucrative market in the energy sector, a lot is happening in India as far as green initiatives are concerned. The Indian government has also set the target of producing a minimum of 22 gigawatts or 22,000 megawatts of solar power by 2022 - maximum target is to reach 72 gigawatts of solar power by that time. Example: "Gujarat canal-top solar power project".

CHRONOLOGY OF GREEN MOVEMENT

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Some centuries ago, matters of general benefit such as the betterment of earth might have sounded absurd. Visionaries are valued because they have the ability to see things way ahead of their time. As early in the 14th century, the importance of keeping a leash on the amount of resources we burn was felt. The events that contributed to the consciousness on environmental awareness have started in early centuries. Some of the sample events are given below.

1. **Year 1306:** England King Edward I tried to ban open coal fires in England, marketing an early attempt at national environmental protection. He was the first monarch to understand to understand this problem.
2. **Year 1690:** Governor William Penn requires that one acre of forest be saved for every five that are cut down in the formed city of Philadelphia. It was amongst the earliest acts known as Eco- friendliness.
3. **Year 1806:** Heat economiser invented. Economisers are heat exchangers that are used for a variety of purposes, and facilitate "saving of energy".
4. **Year 1900:** Ferdinand Porsche builds Hybrid electric car. It is almost that in thata time when even basic electricity to homes was not properly mainstream, a man, albeit with the prominent resources, Mr. Porsche, had vision to create a technology that would only enter the realms of 'relevance' almost 100 years later. The Lohner-Porsche is the name of the car.
5. **Year 1952:** The groundwork is laid for the proper framing of the forest policy in India. It is forward thinking on the part of the Indian policy makers of that time. The act aimed at keeping one-third of the area protracted under national control for proper supervision.
6. **Year 1953:** Bell Labs created a highly efficient model for solar cell. Nikola Tesla has never been considered an awesome scientist. Facts that he was always been out in the open started coming to the fore. He basically invented alternating current and pioneered its usage, laid the groundwork for the invention of radio, proposed the radar, the x-rays, the transistors, radio astronomy, neon lighting wireless communication, electric motor, remote control. He calculated the resonant frequency of the earth. And then went to create an oscillator that emitted corresponding variations, and that reportedly caused an earthquake powerful enough to bring his whole laboratory down.

BUYING RIGHT

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"Some gadgets are more eco-friendly than others". The concept of Buying Right" or buying eco-friendly products and goods, the gadgets is taking up root in the modern Indian customer.

ECO-FRIENDLY PRODUCT

Eco-friendly means earth-friendly. It refers to products, which contribute to green living or practice that may help to conserve thing like water and energy. They prevent land, water, air pollution. By their usage, most of products help conserve energy, minimize carbon footprint or the emission of green house gases at the same time and don't lead to an overall increase in the pollution. Most of the majority of these products are biodegradable, recyclable or can be composted. The demand for such recycled products leads to the completion of the recycling loop.

Need to Buy Eco-friendly Products

The rate at which we are consuming resource is staggering. The people are producing goods, using and then discarding them at a break neck speed. If the people don't switch to green products, the world will be surrounded by pollution and toxins owing to products, using and disposing off the non-green items, due to this there would be no demand recycled items, the recycling industry would come crashing down. There would be a serious shortage of resources and energy. Usage of eco-friendly products allows each and every one of us to decrease the negative effect.

Identify Eco-friendly product

Eco-friendly products are not all green in colour, to identify genuinely eco-friendly products, various programmes have been set up in collaboration with the respective governments to certify green manufacturers. Some progremmes use Eco lable such as "Energy Star" and "Green Seal" to endorse such products. One such standard is the "Eco Label" used in most of the countries of the European Union. The label used in the Germany is called the "Blue Angel".

Understanding Green Washing

A majority of the customers are positively affected by the application of the eco-friendly label to products. Most of the countries sometimes take an advantage of this fact by labelling their products "eco-friendly" or "environment-friendly". Called Green Washing, this tactic in perpetuated by marketing campaigns aimed to help increase the sales of the company by targeting the ecologically-conscious buyers.

Green Followers

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There have been some companies over the years that have gone out of the way to incorporate sustainability and environment-friendly practices into their culture even when the laws didn't demand it. Some of the initiatives taken by the companies are given below.

Hp provides a large number of environmentally-responsible recycling solutions in over 45 countries, regions, territories. It was among the first companies to begin electronic recycling back in 1987 and launch HP planet partners for return and reuse of laser cartridges in 1991. HP has recycled close to one billion pounds of Hardware and print cartridges globally with an aggressive goal to reach two billion pounds soon. HP planet partners enable the return and subsequent recycling of HP ink cartridges and laser jet supplies. HP uses top quality recycling facilities to process each product which was returned through multi phase recycling process. The various products are stored and shredded then separated into plastic and metal. Recovered plastic and metal materials are further processed into their raw form so that they can be used in various new HP products like cartridges, computers, automotive parts, microchip processing trays etc. With technology developing at faster pace tonnes of obsolete computer hardware is being added to landfills worldwide. HP's computer hardware recycling service aims to cut down on the hardware wastage put the raw material to good use. This simply environmentally sound programme allows customers and business users to return and recycle any brand of computer hardware.

- "CANON" is another company whose green initiative is "Generation Green". It aims to reduce the environmental burden in all stages of a product lifecycle. Generation Green is designed to provide business partners, customers, consumers a way to identify and learn about the various green products and solutions that Canon offers. Example: cost saving through energy efficiency. The aim is to create products that are considered to the people and the global environment. Generation Green is focused on the three main areas are: Eco-conscious, Eco-standard and Eco-friendly.
 1. Eco-conscious is focused on canon product features that help users to conserve energy and reduce waste.
 2. Eco-standard is aims to keep harmful chemicals out of production and consumption low.

3. Eco-friendly aims to give customers a change to get involved with the canon recycling programmes.

Canon started its "toner recycling" programme in 1990 as per the clean earth campaign. More than 200,000 tonnes of toner cartridge has been recycled. The recycling facility was expanded to include hardware in 2004. Canon has several Eco-Conscious features in its green line of printers. They include quick start, which aims to reduce the energy consumption. On demand "Suft Rapid Fixing" is another technology that was introduced which uses linear ceramic heater to heat the print quicker, resulting in reduction in the energy consumption by 75% Canon has also reduced the size of the boxes it uses by about 25% to increase efficiency of transport. Canon has started using new materials such as air shell packaging, which reduces carbon dioxide emission during transport by 23%. The "Canon Forest Program" was launched in 2008 under which for every 10 new and existing Generation Green products registered, the company will plant one tree. Canon has furthered partnered with Arbor Day Foundation to plant over 100,000 trees over the past three years.

- Dell has built its sustainability Strategy over the years by setting challenging targets and then achieving them. In 2008, it was announced by Dell that it would cut down its emissions by 40% by 2015 and the company is well on its way to achieve its target. Dell strategy is to reduce the environmental impact of its products at every stage of their lifecycles right from design to disposal. The company has further used more than 7 million pounds of recycled plastic to produce new produces. Dell has the technology industry's more comprehensive recycling plan.

CONCLUSION

This paper has analyzed the causal relationship between green management measures and technological environmental innovations. We have stated that the significantly positive effects of green management on corporate environmental performance in former econometric studies could be influenced by endogeneity problems due to structural reverse causality or unobserved firm heterogeneity. As a consequence, the apparently significant effects of green technology on green management or the reverse of green management on green technology could be influenced by biased and inconsistent parameter estimates. Firms which already have realised such innovations in the past are more likely to possess environmental capabilities of overcoming management barriers such as the lack of finance or know-how at least once before.

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