

A STUDY OF GREEN BUSINESS STRATEGIES
AS A SOURCE OF COMPETITIVE ADVANTAGE
FOR SMEs,
WITH SPECIAL REFERENCE TO PUNE REGION

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Submitted by
Gurudas Vasant Nulkar

Under the Guidance of
Dr. Rajan Narhar Dhamdhere

July 2014

FORM 'B'

I hereby declare that the thesis entitled “A study of Green Business Strategies as a Source of Competitive Advantage for SMEs, with special reference to Pune Region” completed and written by me has not previously formed the basis for the award of any Degree or other similar title upon me of this or any other Vidyapeeth or examining body.

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Research Guide : Dr. Rajan N. Dhamdhare

Place : Pune

Date : _____

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Chapter 1

Introduction, context and importance of the research topic

Chapter 1 - Introduction, context and importance of the research topic

1.1 Economics and the environment

Since the birth of industry, nature has been the prime provider of inputs for our economic activities. Minerals, metals, energy from fossil fuels, water, gases and plant and animal produce are the pillars without which there would have been no industry. These resources are the ‘natural capital’ on which industry has been based on. The earliest humans were dependant on natural resources for their survival, shelter and food. Even in this age of information technology, we are no different from those early humans – our generation of money is based on consumption and use of natural resources. Our economic model of the marketplace ensures that those who do not have money are deprived of food, comfort and shelter. Countries strive for growth in economic activities and GDP is an accepted measure of growth in many countries, including India. For an increase in the GDP, industrial and economic activities must increase. However, for these industrial and economic activities, we must receive a supply of ‘free’ resources from nature. As activities grow, so does extraction of natural resources, putting the environment under a strain of fast depletion. In the last 200 years after industrialization, man has depleted more resources than all the inhabitants have done since life began on the planet.

Nature provides two kinds of resources – the renewable and the non-renewable ones. The renewable resources either increase in quantity or otherwise renew itself over a short (i.e. economically relevant) period of time. Hence, if the rate of extraction takes account of limitations in the reproductive capacity of the resource, renewable can provide yields over a time horizon. The economic relevance of the timeframe is important, since some resources may be renewable by definition but not in practice. For this reason, fossil fuel is classified as non renewable simply because it takes millions of years for dead trees to be transformed into coal and oil (Blundell & Armstrong, 2007). Examples of renewable resources are fisheries, forests and fresh water. Non-renewable resources do not grow or otherwise renew themselves over time. Thus, the non-renewable resources exist in finite quantities. This means that every unit consumed today reduces the amount available for the future. The non-renewable ones can be termed as the “stock” while the

renewable ones are the “flow” in nature. The non-renewable fossil fuels are transformed into energy and the minerals into raw materials - essentials for the production of virtually any product or service. Industry requires both these inputs from nature to undertake their economic activities.

1.2 Industrial growth and depletion non-renewable resources

Growth in population, technology and human aspirations have led to a dramatic increase in consumption of goods and services in society. Urbanization and globalization have put additional pressures on consumption. As globalization sets in, human aspiration helps create demand. The pressure of urbanization is best seen in large cities, which burn more fuel per capita than small settlements. As cities grow richer, consumers aspirations grow demanding more products. Growing demands have to be matched with an increase in production. As the production grows, it consumes more natural resources. This further depletes resources. One of the major concerns of environmental economics has been that the value of natural capital is not accounted for neither at the individual company nor in national accounts. Consequently, neither is their contribution to the development of a nation accounted nor does the impact of their degradation and depletion show up. Economists call this the externalized cost (Tietenberg & Lewis, 8th Edition). We pay the milkman not the cow; we pay to extract fossil fuel, not the earth. The increasing production consumes more and this leads to an overuse of resources. As the real impact of over-exploiting forest, soil, or water resources occurs in the future, neither the industry nor the consumers have any immediate incentive to limit their exploitation of the natural resources (World Trade Organisation, 2010). This puts a growing pressure on the earth.

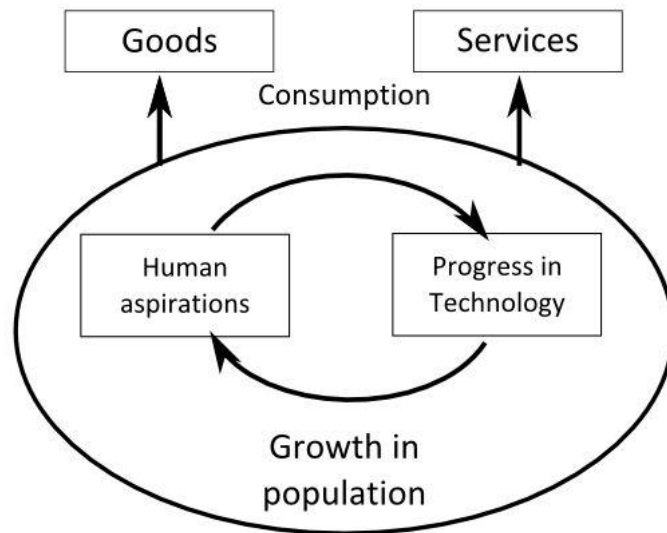


Figure 1: Drivers of consumption

Advances in technology can potentially increase the supply of resources by opening up sources not known before or allowing extraction not possible earlier. But the same advances also increase depletion by increasing the usage rate. The last century has been a witness to some of the biggest depletion of natural resources from this planet. The consumption of non-renewable resources has increased in such proportions that their stock-out is expected to be earlier than our best predictions.

1.3 Industrial Growth and pollution of renewable resources

Nature does not produce any waste. The complex food chain has producers, consumers and decomposers, all of which produce waste which is food for another species. Nothing in nature pollutes the planet. The only real pollution happens due to economic activities of humans. Industrial production leaves a trail of waste. Right from extraction of natural resources, waste is a necessary by-product in manufacture. Every industry generates some form of waste, as does the process of consumption. During the early stage of industrialization, this waste was let out in the 'commons' – either air, water or on soil. This waste was alien to the food chain and in some places, played havoc. Years of indiscriminate pollution created serious health problems. The pollution has left many sources of water, soil and air unsuitable for life. The depletion of non-renewable resources has an equally monstrous ally in the pollution of the renewable ones. Over the

years, societal awareness on the rampant environmental degradation forced industry to improve their ways. Governments stepped in and the era of command and control ensured that industries treat their pollution before dumping into the commons. As technology improved, today we pollute far less than what we did in the earlier century. However, growing consumption is not helping either. The city of Pune, once a pensioner's paradise, has over 2 million two wheelers. The pollution created in consumption is growing every day. Technology begets newer challenges - far more challenging forms of pollution are emerging with new technologies. Consider the case of Fukushima nuclear power station – the pollution caused by nuclear contamination was not anticipated. We do not yet know what to do with the highly toxic waste from nuclear power stations. Space debris, or space junk, is made up of tens of millions of man-made objects that have been discarded, lost, or left in orbit. Some pieces are fairly large — spent rocket stages or defunct satellites — but the majority are incredibly tiny, including flecks of paint and eroded bits from other spacecraft. This suggests that new products will beget new kinds of pollution.

There is a dichotomy between Earth's resources and societal demands, which are in conflict. The dominant paradigm of Anthropocentrism or human-centered ethics, is central to our economic systems. The anthropocentric view bases human needs upon desire. It is the base of growth-orientated economic development. Anthropocentrism inflicts an perversion to material consumption straining the finite resources on the planet. The earth is the only source of natural resources for economic activities, and, it is also the only sink for industrial activities – all waste goes back into the planet. The immense assimilative capacity of the planet has led us to believe that we cannot damage it by dumping waste and our faith in technology has made us feel that technology can undo the damage. Both these beliefs have been proved to be wrong and in continuing our current way of life, will lead to an environmental disaster.

1.4 Industry response to the environmental challenges

The response of industry towards improvement of their environmental management developed in two eras in two decades, beginning 1970 (Fischer & Schot, 1993). In the first era, companies faced regulations for which they had to act through improvements. Air, water and soil pollution regulations forced companies to correct or improve their

environmental performance. The early approach was thus a more reactionary approach. This has been termed as the “resistant adaptation” (Fischer & Schot, 1993) of industries. The norm of this era could be summed by in one word “Compliance”. Over the years the environmental movement kept growing and crossed national boundaries. Many NGOs and agencies felt that the current regulatory approach was not enough for the planet. This was supported by scientific research. Corporate leaders too came ahead to voice their thoughts on this. The environmental movement matured significantly. The sustainability approach made managers to look beyond the obvious and predominantly technical environmental actions. Businesses exercised greater discretion in their environmental responses.

Industry’s journey from environmental ignorance to sustainability is depicted in Figure 2. The journey starts with removal of natural resources for industrial activities and creating waste and pollution in the process. The era of control was driven by regulation where the US EPA played a leadership role. The next era was driven by industries where they realized that prevention was cheaper than control. Formalized environmental management systems set the standards and differentiated the leaders and followers. The next stage saw design for the environment, life cycle assessment and green positioning of companies. These set the stage for the era of sustainability, which we are now experiencing.

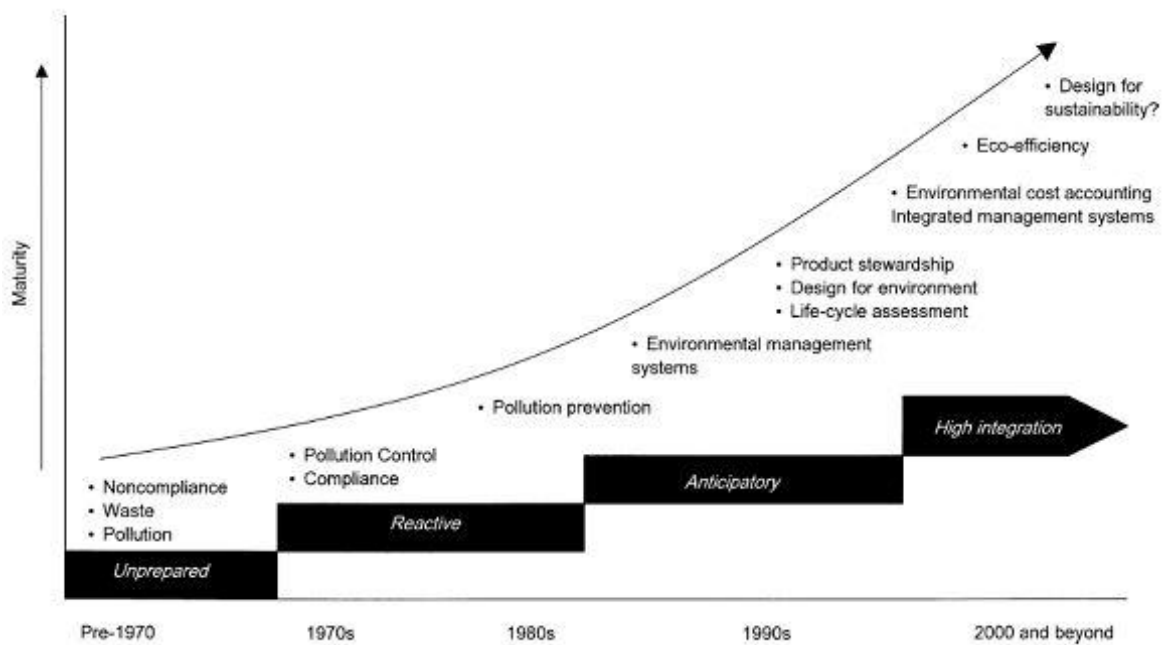


Figure 2: Industry's Journey towards Sustainability

source: Richards and Frosch (1997)

1.5 The early approach

To be profitable over time, businesses need to be efficient, invest wisely and strategize in the competitive landscape. Early economists were convinced that technology was the essence of competition (Schumpeter, 1950). Since then, economists and strategists have studied how technology shapes the competitive dynamics of businesses. Milton Friedman's famous comment was that the social responsibility of business is to increase its profits (Friedman, 1970). During this period, management theory had ignored the constraints imposed by the environment upon businesses and consequently most of the literature and research in business strategy did not account for the environment. The two prevalent views on business strategy – the resource based view (Wernerfelt, 1984) and the industry view (Porter, 1980) both do not account for the environment. Improvement in the environmental performance was mostly seen as a constraint. Hence companies considered environmental problems when more restrictive laws were passed. Companies would deal with this unnecessary cost as an operating problem for which a reactive approach was enough (Azzone & Bertele, 1994).

In the last few decades however, there has been some serious rethinking on how businesses need to operate within nature and how societies should treat the environment. Today, the world is more or less in agreement that the magnitude of environmental problems may snuff out life on this planet. The Sixth Extinction may not be far (Leakey, 1996). There is growing pressure from public institutions, scientists, markets and non-governmental organizations demanding that industries improve their environmental performance. In a way, improvement in the environmental performance resulted in savings for companies. Competitive pressures on cost of production increased and companies were driven to produce more efficiently and use fewer raw materials. Reducing the use of energy, water and minerals certainly helped profits. New and more efficient technologies produced similar results. Once waste and pollution was looked at as a manifestation of inefficiency, corporations invested in technologies to reduce them. Significant cost advantages were experienced through efficient use of raw materials and energy and reduction of wastages. Investments in more efficient and less polluting processes followed. Recycling was used to the advantage for reducing material usage leading to savings.

While these actions helped businesses in increasing their efficiencies, they certainly benefitted the environment. Industries saw a collateral benefit too – in conducting these “green” activities there was a chance of improving their image in the market - an increasingly necessary objective due to the growing consumer awareness. This was the first era of ‘green’ activities that the industry benefitted from. During this period, the drivers for green practices were mainly gaining economic benefits and meeting regulations. Simple voluntary practices included reducing paper consumption, reducing travel, recycling grey water and harvesting rain water on factories and warehouses.

These green practices were within reach for all and companies lost no time in engaging in these activities. As more and more companies started doing the same things that others did, the economic advantages leveled off making it more necessary than differentiated. Improvements in the environment were apparent in most industrialized countries as stricter compliances and voluntary measures resulted in lower pollution levels.

1.6 The ‘Sustainability’ approach

There is a limit towards how much can be achieved through the command and control of regulatory systems or fiscal measures. In the year of 1972, the United Nations focused its attention on environmental activities in the world and formed the UNEP – United Nations Environmental Program (<http://www.unep.org/>, 2012). The UNEP environmental assisted developing countries in implementing environmentally sound policies and practices. This program was founded as a result of the United Nations Conference on the Human Environment in June, popularly known as the Stockholm Conference (UNEP declaration). The mission of the UNEP is *“To provide leadership and encourage partnership in caring for the environment by inspiring, informing, and enabling nations and peoples to improve their quality of life without compromising that of future generations. (UNEP)”*

The United Nations Conference on the Human Environment was an international conference convened under United Nations auspices in 1972. It was the UN's first major conference on international environmental issues. The Stockholm conference is considered to sow the seeds of political and public awareness of global environmental problems. The proceedings seem to have an impact on the environmental policies of the European Community which later became the European Union.

In the meet of December 1983, the UN General Assembly agreed that there was a deterioration of the human environment and natural resources for which the UN decided to establish a Commission to help countries work together to pursue sustainable development. Gro Harlem Brundtland, the former Prime Minister of Norway headed this commission, which has since been known as the Brundtland Commission and also known as the World Commission on Environment and Development (WCED). In the December of 1987 the commission published the Brundtland Report titled *“Our Common Future”* (WCED, 1987). This report defined sustainable development as *“development which meets the needs of current generations without compromising the ability of future generations to meet their own needs”* (WCED, 1987). The concept supports strong economic and social development, in particular for people with a low standard of living. At the same time it underlines the importance of protecting the natural resource base and

the environment. Economic and social well-being cannot be improved with measures that destroy the environment. The Brundtland Report was a response to the conflict between the globalized economic growth and the ecological disaster on a global scale. The challenge posed in the 1980s was to harmonize prosperity with ecology.

A major UN conference was held in Rio de Janeiro in June 1992. The United Nations Conference on Environment and Development (UNCED), also came to be known as the Rio Summit, Rio Conference or the Earth Summit. Some important environmental issues that were addressed in this. As a result of this conference, companies from several parts of the world promised actions to reduce their environmental impacts. But the next meeting at Johannesburg in 2001 showed little progress which could actually make any impact. Many companies had implemented better standards, and some had gone beyond compliance. Yet this was not enough. Simply reducing environmental impact and saving money in the course could not repair the undoing of the last few centuries. The first green era was not the path to sustainable development. The public good of environmental protection could not be nurtured simply by driving the private good of cost reductions.

Many large companies have come forward since then and willingly pursued ambitious sustainability initiatives. These are the companies who have realized that these actions could be a source of competitive advantage. Taking such initiatives ahead, some companies have an environmental strategic management process in place which benefits its competitiveness while achieving public good. The question of “does it pay to be green?” is answered in the positive. The new paradigm acknowledges the sustainability imperative while making strategic choices which improve the company’s environmental performance. This era realizes that environmental policies need to be based on economic fundamentals of the business. This era also addresses the growing environmental risks for businesses – risks of facing government actions, competitor’s actions, public outrage and even employee issues. Customers and the public at large can take away a company’s “social license” to operate as was demonstrated recently in Pune. Dow Chemicals had to cancel its Rs. 400 crores R&D project in Pune due to intense public pressure – people had not forgotten the Union Carbide disaster in Bhopal over 25 years ago. While many companies will want to be more responsible citizens, not all will be able to create a

competitive advantage leading to a valuable position. Pursuing improvements in environmental performance does not automatically create opportunities of advantage and profitability. Nor can they be expected to maximize gains in the short run. In the early 1990s, when Toyota was contemplating the car for the twenty first century, it purposefully chose a “green” theme discarding the other obvious themes of power and looks. The Prius has been successful by all standards and has helped Toyota make record profits in 2007. Companies are now looking at environmental performance as a business issue and addressing it strategically. When this approach is followed innovation gains importance. Innovation in product and processes, from cradle to grave of the product including market strategies helps. Companies which have been able to put in innovative solutions to their environmental performance have been able to gain competitive advantages which are not easily imitable.

The rise of international environmental regulations like the Montreal Convention, the Kyoto Protocol, restriction of Use of Certain Hazardous Substances in EEE (RoHS) and Waste Electronics and Electrical Equipment (WEEE) are steps in the sustainability journey. These international regulations make the world more like one village where one country’s products do not have the unfair advantage of wrong resource usage.

From the perspective of the planet and all life on it, businesses can no longer afford to overlook their carbon footprint, their water and energy consumptions, their pollution and their dependence on natural resources. The hope for survival remains on the interface between industry and environment. How well are we able to redesign our businesses in ways that will reduce the rate of depletion, will we be able to reduce the pollution to less than the assimilative capacity of nature? Till now we have pursued technologies which can drill deeper, extract more and burn faster. Can we harness technologies which can benefit the earth and life? The fundamental shift from the first Green era and the second Green era must surely be from inside out thinking to outside in – how much longer will the earth allow us to survive? The trigger for the second Green era must then be sustainability for which the motivation is competitive advantage for companies.

1.7 Sustainability – meaning and interpretations

The word 'sustainability' was originally used in forestry. Acute scarcity of wood crippled the economy of Saxony. Forests had been devoured for the purpose of excavation, for mining the ore and for the charcoal-fired smelting furnaces. The Inspector General of Mines criticized the attitude of being oriented to short-term profits, arguing that fast profits destroy prosperity. He suggested a system to ensure that only as much wood was logged as could grow back in the same time. The term 'sustainability' or 'sustainable development' is used today to describe this approach to forest management aimed at ensuring an adequate, sustainable supply of timber for future generations. Then, as now, the sustainability idea was born of a crisis. It became popular in the 70s, when the Club of Rome published its report pointing to the global "Limits to growth".

This concept further received worldwide recognition in the Brundtland Commission's report "Our Common Future". Sustainability demands that we pass on to our children a world that is virtually no worse than the one we inherited. We should live off the 'interest' and leave the 'capital' untouched. The EU formulated the three pillars of sustainability at its Copenhagen Summit. Known as the "three-pillar model of sustainability", the principle states that sustainability not only comprises the natural heritage we pass on to the next generation but also the economic achievements and social institutions of our society, such as democratic political participation or peaceful conflict resolution. Sustainable development thus rests on an ecological, an economic and a social pillar. If one of the pillars gives way, the 'sustainability building' will collapse. Thus the concept a holistic approach by incorporating the three dimensions of Environment, Society and Economy. These dimensions were termed by John Elkington as the Triple Bottom Line (Elkington, 1997). His argument was that companies should be preparing three different (and quite separate) bottom lines. One is the traditional measure of corporate profit—the “bottom line” of the profit and loss account. The second is the bottom line of a company's “people account”—a measure in some shape or form of how socially responsible an organisation has been throughout its operations. The third is the bottom line of the company's “planet” account—a measure of how environmentally responsible it has been. The triple bottom line (TBL) thus consists of three Ps: profit, people and planet. It aims to

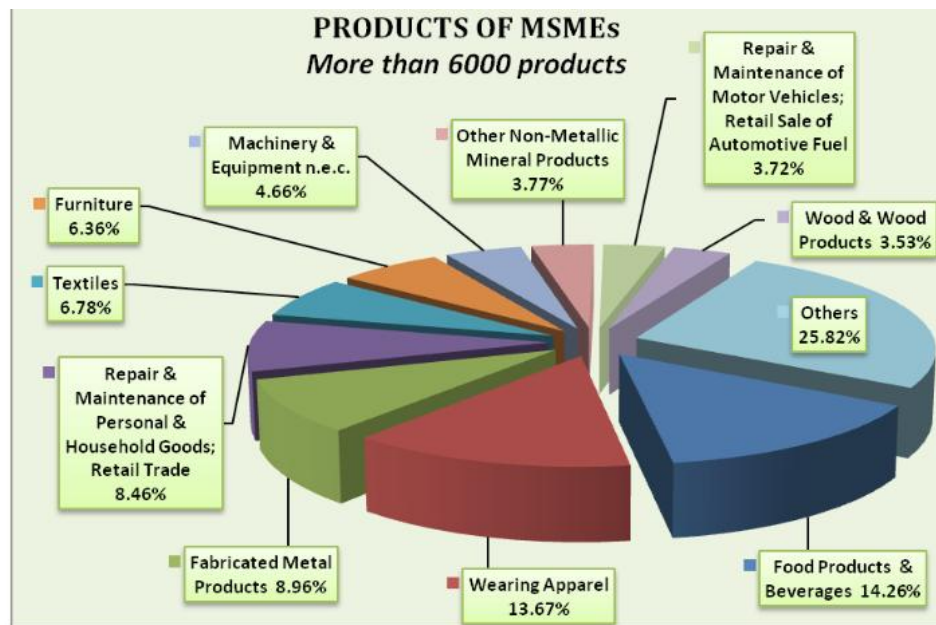
measure the financial, social and environmental performance of the corporation over a period of time.

Nature does have limits and we must live well within these and following its rules. Sustainability also makes a distinction between ‘growth’ which is quantitative and ‘development’ which is qualitative. In this context development must accelerate – development which gives rise to cleaner technologies, lesser consumption, longer life products and addressing the well-being of human and the planet.

There has already been a vast body of research on sustainability in industries and whether it can generate a competitive advantage (Porter & van der Linde, Toward a New Conception of the Environment-Competitiveness Relationship, 1995) (Sharma, Iyer, Mehrotra, & Krishnan, 2010)

1.8 Rationale behind choice of Small and Medium enterprises for the research

Small business companies have been the drivers of the Indian economy. The SMEs



Source: - Final Report of the Fourth All India Census of Micro, Small & Medium Enterprises 2006-07: Registered Sector.

Figure 3: Range of products manufactured by SMEs in India

innovate in technology and processes which are specific to small and lean organizations. The flow of Foreign Direct Investment (FDI) in many sectors has been a result of strong and healthy SME base available here. As a result, SMEs are getting more opportunities to expand their activities and diversify their business in growth sectors of the Indian economy. This sector plays a critical role in employment, nurturing talent and providing opportunities in India. In India, it is estimated that in terms of value, MSME sector accounts for about 45% of the manufacturing output and around 40% of the total export of the country (GOI). This sector has consistently registered a higher growth rate than the rest of the industrial sector (Ministry of MSME, 2011). There are over 6000 products ranging from traditional to high-tech items, which are being manufactured by the MSMEs in India (see figure 2).

Further, the attitude to environment management in India is less than positive and is often seen in the narrow context of 'pollution control'. Thus, it is best left to the relevant administrative departments who manage it only through legislative enforcement. The ownership of environmental concerns is, therefore, not widely held by several important stakeholders such as the community, public and private institutions.

1.9 Definition of small and medium enterprises

Small companies are classified by various criteria in India and other countries. A small company in Europe may well be a medium or large company by Indian criteria. In India, the Reserve Bank of India, Income tax authority and the Ministry of micro, small and medium enterprises all have different rules for their classifications. Similarly, different criteria exist in Europe, Japan and USA for their classification. Further, MSMEs in manufacturing and services sector have different criteria. Manufacturing sector refers to enterprises engaged in manufacture or production, processing or preservation of goods, while the services sector refers to enterprises engaged in providing or rendering of services.

For the purpose of this research, the definition proposed by the Ministry of MSME, government of India, will be used. Micro, small and medium enterprises as per MSMED Act, 2006 are defined based on their investment in plant and machinery (for

manufacturing enterprise) and on equipment for enterprises providing or rendering services. The defined limit on investment for enterprises to be classified as micro, small and medium enterprises is depicted in table 1:

Table 1: Criteria for Classification of MSME in India

Classification	Manufacturing Enterprises Investment in Plant & m/c upto INR	Service Enterprises Investment in equipment upto INR
Micro	2.5 million	1 million
Small	50 million	20 million
Medium	100 million	50 million

In calculating the investment in plant & machinery, the cost of pollution control, research and development, industrial safety devices will be excluded.

Source: MSME Annual Report 2011-12 by Ministry of MSME, GOI

In this research and the dissertation, the following terms are used interchangeably and mean the same: SME, small companies, MSME. In some countries, they are also referred to as SMBs - small and medium business. Further, these terms are also used interchangeably and are synonyms: company, business, company, organization.

1.10 SMEs and the environment

The total number of registered and unregistered SMEs in India at the end of 2007 was estimated to be 26.12 million units (Ministry of MSME, 2011). The size of this sector necessitates huge and growing demands on energy and other natural inputs. A large portion of the output of the SMEs is towards making intermediates for the large industrial units. Thus, the large scale producers will consume natural inputs through the channel of SMEs. While the aggregate impact of the SME is large on the national product, there have been very few studies on the environmental performance and impacts of these companies. Studies in Europe show that in UK 60% of total carbon dioxide emissions are from SMEs, while 70% of all pollution is from them (KPMG, 1997).

SMEs offer a challenge and opportunities when going green. Due to the sheer number of units, if we can get them improve their environmental performance, it will make a sizeable impact on the environment. Many small companies do not perceive their own environmental impacts as significant when placed against large corporations. SME's impact on the environment is not on the national scanner is possibly due to three main reasons: First - the media is not as watchful of the SME sector as they are with the large corporations and multi-national companies. Second -the sheer number of companies in this sector puts a huge challenge on the regulatory authorities to be the watchdog for offences. There have been many cases toxic waste and contaminants let out by small companies in India and the offenders are not discovered. Third – SMEs do not have the same set of competencies as large companies to improve their environmental performance. By their nature, small companies have limited capacity to deal with the variety of issues that they face daily.

While the magnitude of impact on the environment of an individual SME will depend on the technologies employed, packaging used, energy consumption patterns and distribution and supply chain usage, there is no doubt on the necessity of them improving their environmental performance.

1.11 The Indian context

India has a fairly extensive set of regulations designed to improve both air and water quality. The Water Act of 1974 and The Air Act of 1981 form the foundations of the regulatory framework. These acts created the Central Pollution Control Board (CPCB) and the State Pollution Control Boards (SPCBs). The responsibility of enforcement rests with the SPCBs. The Ministry of Environment and Forests (MoEF), created in its initial form in 1980, was established largely to set the overall policies that the CPCB and SPCBs were to enforce. In 1984, what came to be known as the Bhopal Gas Tragedy was a catastrophe that had no parallel in the world's industrial history. In the early morning hours of December 3, 1984, a rolling wind carried a poisonous gray cloud from the Union Carbide Plant in Bhopal, Madhya Pradesh. Forty tons of toxic gas - Methy-Iso-Cyanate was accidentally released from Union Carbide's Bhopal plant. The gas spread throughout the city and the magnitude of devastation was evident only the following morning. An

estimated 10,000 or more people died and about 500,000 more people suffered the disastrous effects of the polluted air. No one is certain if future generations will not be affected. The Bhopal Disaster of 1984 represented a turning point in the course of Indian environmental policy. Following this tragedy, India enacted new environmental laws. In 1986, the Environmental (Protection) Act aimed at "protecting and improving the quality of the environment and preventing, controlling and abating environmental pollution" (Lemmer, 2007). In 1994, the Ministry of Environment and Forests (Ministry of Environment & Forests, 2012), India's main environmental agency, enacted EIA to strengthen environmental protection. Initially, protection was weak, failing to cover numerous activities such as deforestation and waste disposal (Lemmer, 2007). Amendments to these laws have strengthened them subsequently. The Policy Statement for abatement of Pollution issued by the Ministry of Environment and Forests in 1992, provided instruments in the form of legislation and regulation, fiscal incentives, voluntary agreements, educational programmes and information campaigns in order to prevent, control and reduce pollution. The establishment and functioning of any industry is governed by the following Acts of the Ministry of Environment and Forests (MoEF) besides the local zoning and land use laws of the States and Union Territories (Singh & Brown, 1999):

1. The Water (Prevention and Control of Pollution) Act, 1974 (Water Act)
2. The Water (Prevention and Control of Pollution) Cess Act, 1977 (Water Cess Act)
3. The Air (Prevention and Control of Pollution) Act, 1981 (Air Act)
4. The Environment (Protection) Act, 1986 (EPA)
5. The Public Liability Insurance Act, 1991 as amended (PL Act)
6. The National Environment Tribunal Act, 1995.
7. The National Environment Appellate Authority Act, 1997.

Further, the Central Pollution Control Board has identified 17 highly polluting industries, the majority of which are manufacturing industries.

S. No.	Industrial Category
1	Aluminium
2	Cement
3	Chlor-Alkali
4	Copper
5	Distillery
6	Dyes and Intermediates
7	Fertilizers
8	Iron & Steel
9	Oil Refineries
10	Pesticides
11	Petrochemicals
12	Pharmaceuticals
13	Pulp & Paper
14	Sugar
15	Tannery
16	Power Plant
17	Zinc
	Total

Figure 4: Red List of polluting industries in India

Once an industry has been set up, during the process of manufacture and operation, the industry is also required to meet the standards of emissions, effluents and noise levels prescribed under the EPA rules framed under the Environment (Protection) Act of 1986. This act is umbrella legislation for the protection of environment in the country.

India's population of nearly 1.2 billion accounts for about 17 percent of the planet's population. The rapid economic growth of about 6.4 percent annually over the last two decades is placing significant pressure on the environment. Even if India's growing economy produces less pollution and fewer global warming emissions than either China or the United States, its growing population is a source of global concern. Some critics feel that local solutions, strong local governances and practices and traditional environmental-friendly social practices can tackle these issues. In a globalized economy such solutions may not be complete. For example, it is imperative to share global technology, global products and manufacturing practices.

Regulation, enforcement and traditional practices may thus not be enough in the global economic context. Companies need to look at their environmental performance from a strategic perspective. This perspective may offer opportunities of innovation and competitive advantage, which would lead to improved economic performance. Indian

industry has the social responsibilities of improving living standards of a growing population while simultaneously reducing environmental impacts.

1.12 Conclusions

The inhabitants of this planet are left with very little time. Either we change our course of actions or face the consequences that the planet has in store for us. While individual efforts are imperative, we cannot ignore collective efforts of societies, industries, states and nations working towards reducing the impact. It is too large a task for any government to drive the movement. Stakeholders in the industry will need to change their behaviors significantly. Regulations and self-control are required in the present state. The present generation of business managers may not have had access to environmental education the way today's schools are imparting; yet they must themselves take efforts to be more informed about this. The role of media assumes a pivotal responsibility – fuel the green consumer movement and promote green industry images.

SMEs together can make a large scale impact. Incremental green practices will no longer matter. Radical changes in product design, manufacturing technologies and supply chain are required. A strong motivation for SMEs is that in doing so, they stand to gain green competencies which will be more in demand in the immediate future – most of their customers are large players who have already switched over to more responsible environmental behaviors, or are actively pursuing it.

This research aims to study the present state of environmental behavior of SMEs in the Pune region and explores how SMEs in other countries have reacted. An attempt is made to offer a framework for Indian SMEs to implement in their own businesses, with their present resources and stay competitive.

Chapter 2

Statement of the Research Problem

Chapter 2 - Statement of the Research Problem

2.1 Introduction

The question of “does it pay to be green” has been hotly debated in management literature. The trade-off between monetary gains and environmental impacts is not simple to assess in the present economic structure. Indeed, there have been equal arguments from both sides – society wants more comfortable life which industry is ready to offer and the environment degrades from each economic activity of man. The industry-environment stand-off is unlikely to reach a consensus soon. Several researchers have suggested intermediate paths which promise a lesser impact while meeting increasing human wants. Some researchers have made compelling arguments in favour of treating environmental performance as a business issue. They have suggested that greener companies have a lower cost advantage and a differentiated image which can help secure favourable relations with customers. There is a small but increasing segment of customers who demand environmental performance reporting from their suppliers. They evaluate vendors on quality and environmental standards since they themselves pursue environmental goals. This research takes this particular argument and explores it from the perspective of small and medium enterprises.

2.2 The Research Gap – Indian SMEs

There is a large body of research available on this topic done in several countries. This researcher studied research papers from the following countries – Austria, Denmark, European Union, Georgia, Korea, Malaysia, New Zealand, Sri Lanka, Taiwan, Turkey, UK and Vietnam. Similar studies have been conducted in many other countries also. However, barring a few papers of studies conducted in 2005 and 2006, nothing else was available. There is a paucity of extant literature on the topic of environmental sustainability within SMEs in India. This is surprising, since the sheer number of SMEs in India indicate the potential to improve the environment. The Indian industry has always acknowledged the SME as the growth engine of the Indian economy.

With this background the researcher felt the need to produce relevant research which is more current and captures the practices, challenges and issues specific to SMEs in India.

The diversity of the Indian peoples is too vast – they differ in culture, language, education, resource availability and connection with market. This poses a unique challenge for any research which tries to make estimates for the entire country based on research in one region. For example, one of the biggest challenges for SMEs in Vidarbha region is availability of continuous power for factories; on the other hand, this is not considered an issue at all by SMEs in Pune. Their challenge for Pune SMEs is burgeoning wages and salaries and cost of living. This increases the SME's costs of operation much more than those in Vidarbha region. Similarly, SMEs in Rajkot and Kolhapur are challenged to find skilled labour in their factories, many of whom are migrating to the nearby cities of Ahmedabad and Pune.

2.3 Research Question

Traditionally, businesses have sought competitive advantages through control of unique resources, gaining unique skills or attaining core competencies. This approach seems to work well for companies, because they stand to gain economic benefits from these investments. Strategy and competitive advantage are much discussed and researched topics in management literature and provide well grounded approach and frameworks for companies. This research sets about to seek if green business strategies can result in competitive advantage for the company. As previous research suggests, companies must integrate environmental goals in their business performance and in doing so, they can environmental expect a competitive advantage. Is this applicable to SMEs? The central problem this research addresses is that in small enterprises, can improvement in environmental performance be pursued as a source of competitive advantage?

Consequently, can this transform what are cost burdens today into strategic investments for tomorrow? The central argument of the research is businesses must recognize the value arising out of the company's environmental impact and strategically position itself to gain competitive advantages.

The research focuses on the integration of environmental practices with mainstream business and its impact on the business performance. Therefore the research dwells more on the strategic aspects of resources and practices affecting the environmental

performances of companies, and less on the techno-legal aspects of environmental management. The research was conducted on the SMEs in the Pune industrial region.

2.4 The expected contribution of this research

From the insights gained in this research, the researcher attempts to offer recommendations to two stakeholders – SMEs and policymakers. The recommendations would benefit them in the following manner:

- (i) For Indian SMEs. The insights gained would offer a road map for improving environmental performance. While good intent is not lacking within SME owners, many do not approach environmental improvement with a strategic focus. This set of recommendations aims at offering a road map towards this goal.
- (ii) For Policy makers. The SME sector is vast, varied and is fraught with multiple constraints. In face of all these, a ‘one size fits all’ approach of regulators and policy makers is ineffective in promoting good environmental practices. They need to understand the SME challenges and provide a facilitative business environment. This will be aimed for by the researcher.

To achieve these goals, the research studied published papers from other countries which dealt with similar issues, as well as those from Indian SMEs. Broadly, the research comprised of the following studies:

1. Study of practices and drivers of environmental performance of SMEs in other countries. The countries being studied are :
 - a. Europe – Denmark, UK and Austria
 - b. Asia - Malaysia, Sri Lanka
 - c. Far East – Taiwan and Korea
2. Study of environmental awareness, practices and measures in SMEs.
 - a. Do SMEs have strategic focus on their environmental performance?
3. Study of drivers of environmental behavior and performance in SMEs
 - a. What are the motivators for improving environmental performance?
 - b. What are the obstacles in pursuing improvements in environmental performance of SMEs?

- c. Study of reactive and proactive behaviors of environmental performance in companies
4. Are there competitive advantages for the company in taking up proactive measures in improving environmental performance?

2.5 The Primary Objectives of the Research

In line with the central theme of this research, the primary objective is: To establish whether improving the green performance of an SME can help it gain a competitive advantage in business.

The subject of study was small and medium enterprises, or SMEs, as they are hereafter referred to. The sample for the study was drawn from the Pune industrial area and comprised of SMEs in industrial (b2b) markets. For selecting a sample of SMEs, the definition of SMEs as provided in the MSMED Act 2006 of the government of India is employed in this research. This is discussed in the earlier chapter.

2.6 The Secondary Objectives of the Research

In the pursuit of the primary research objective, several smaller objectives can also be set. Secondary research objectives can be met ‘on the way’ which leads towards the primary objective and at the same time provide useful insights by themselves. This research sets the following secondary research objectives, which were useful in the analysis.

1. To study the awareness and attitudes towards environmental practices in SMEs.
2. To identify the barriers to and positive influencers of green performance for SMEs
3. To study the relationship between green practices in the product life cycle and the level of green performance in SMEs.
4. To identify the benefits gained from green practices.
5. To prepare a model for planning, implementing and measuring of environmental performance towards gaining competitive advantages for SMEs.

The outcome of this research, the researcher hopes, is beneficial for SMEs through proactive environmental management and will help them compete in the future.

2.7 Research Methodology

The broad outline of the research methodology that was followed is depicted in Figure 5.

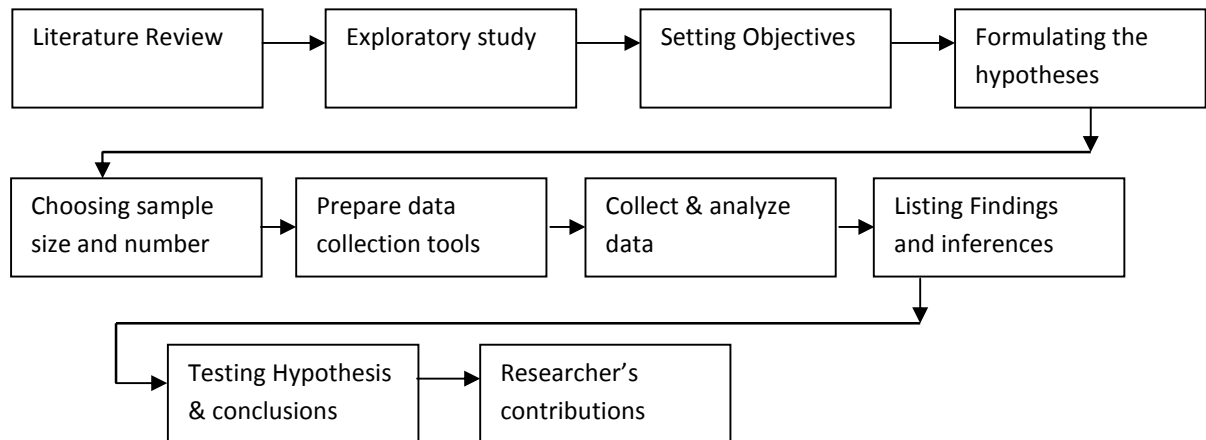


Figure 5: Research Methodology

2.8 The Literature review

In this stage, similar research papers published in the world were studied. Although there has been significant research on green business strategies, it is scarce with SMEs. Relevant papers on SMEs were studied. Most leading journals are available on online sources like Springer, Elsevier, Jstor, Inderscience, EBSCO and Emerald. These sources were accessed in this study. Similarly, numerous books have been published on green competitive advantages. The notable among those are by Vasanthkumar Bhat titled 'The Green Corporation' and 'From Green to Gold' by Daniel Esty and Andrew Daniel. Both these books are published as a result of a longitudinal research done by their authors. Thus these books have a strong empirical orientation to formulation of their theories.

Another aspect which was studied is news for various large businesses and their green practices. These are published in various magazines and newspapers. Thought leader publications like Harvard Business Review and Fortune also have published many articles on this subject.

2.9 The Exploratory studies

Various exploratory studies with different stakeholders were undertaken to understand the business perspectives of environmental management.

1. SME owners – semi-structured in-depth interviews were conducted with 8 SME owners in Pune, for the exploratory study. This helped in gaining insights on regulations, enforcements, motivations and practices in SMEs.

The conversation started with general information about regulation and practices within their companies and then specifically green practices and innovations were discussed. The owners gave good insights on the nature of their own industry, the type of regulatory pressures and the status of current practices within the industry. Questions were asked about how ‘green’ was their entire product life cycle. Detailed interviews are given in another section.

2. Large companies – they are the final buyers from SMEs. The purpose of these meetings was to find out if they could be driving environmental performance improvement in SMEs. Visits were made to the manufacturing plants and meetings were made either with the head of sustainability or the person heading environmental activities.
3. CII – a three day visit to the CII Sohrabji Godrej Green Business Center at Hyderabad was made. Senior counselors with field experience were met and their unstructured interviews helped form the base for the research.

These exploratory studies helped in formulating the conceptual framework as depicted in figure 2. This further helped in formulating the hypotheses and designing the questionnaire.

Chapter 3

Literature Review

Chapter 3 - Literature Review

3.1 Introduction

The founding step of a good research is widely considered to be a detailed study of the subject and a review of literature in the field. The likelihood of similar studies undertaken earlier by another researcher somewhere in the world, is high. Similarly, studies in issues which have some association with the present research could also be found. It thus helps the researcher to undertake a detailed review before setting off on the primary research. The objective of literature reviews are many (a) Since someone somewhere in the world would already have conducted research in a similar issue, their studies can help the researcher gain a deeper understanding of the subject. (b) It helps clarify the research objectives and set hypothesis (c) Justifies the research methodology adopted for the chosen research and (d) helps avoid plagiarism. Cross referencing during the review helped in focusing in the subject area and also opened up many further studies in similar topics already conducted by other researchers.

This study comprised of reading research papers from various other countries, magazine articles and also books. Research papers were accessed from digital research sources tabulated below:

- a. JSTOR – www.jstor.com
- b. Elsevier - <http://www.elsevier.com/journals>
- c. EBSCO - <http://search.ebscohost.com/>
- d. British Library Online Journals - <http://www.library.britishcouncil.org.in/>
- e. Sage Online Journals - <http://online.sagepub.com/>
- f. Wiley Online Journals - <http://onlinelibrary.wiley.com/>
- g. Inderscience - <http://www.inderscience.com/>

All the above sources of research papers are acknowledged to have high credibility. Many of the journals accessed have high impact factors and well cited papers were specially looked for.

3.2 Strategy

“Strategy” is one of the most often used words in business. While the term has been around for many years, it has gained popularity in the Indian business context fairly

recently. The word strategy has Greek roots where stratos means army and agos is a leader. The use of the word perhaps originated in warfare, where a coordinated plan for application of resources had to be deployed. A large number of resources had to function in a coordinated manner to achieve a greater common objective over a long time period. Thus the series of tactics and actions of assault, backup and unit capture all contributed to the victory. Yet virtually everyone writing on strategy agrees that no consensus on its definition exists. Hambrick (1983) suggested that this lack of consistency is due to two factors. First, he pointed out, strategy is multi-dimensional and second, strategy must be situational and thus will vary by industry.

Every company operating in a competitive economy would have some strategy, whether implicit or explicit. The strategy could have been the result of a structured planning process, born out of experience or just evolved over time – or it could be a combination of these three. The first modern writers to relate the concept of strategy to business were Von Neumann and Morgenstern (1947) with their book on theory of games. Numerous other authors have developed concepts of business strategy in the past 30 years. A comparison of these modern authors' concepts has been presented by Hofer and Schendel (Hofer & Schendel, 1978). They found that among the authors, there was major disagreement in three primary areas: (1) the breadth of the concept of business strategy, (2) the components, if any, of strategy, and (3) the inclusiveness of the strategy-formulation process. Another among the first was Alfred Chandler. Chandler (Chandler, 1962) regarded strategies as integrated decisions, actions, or plans designed to set and achieve organizational goals. Yet another notable definition was by Hofer and Schendel. (Hofer & Schendel, 1978) According to this definition, a strategy describes the fundamental characteristics of the match that an organization achieves among its skills and resources and the opportunities and threats in its external environment that enables it to achieve its goals and objectives. Henry Mintzberg (Mintzberg H. , Patterns in strategy formulation, 1978) called strategy as “a pattern in a stream of decisions or actions”

3.3 Michael Porter on strategy and competitive advantage.

Undoubtedly, Michael Porter's books and articles have shaped much of intellectual discussion and thoughts on strategy and competitive advantage. His book “Competitive Strategy” (Porter M. E., 1980) helped diffuse the concepts both in industry and academia.

It is only fitting that a review of literature on strategy and competitive advantage must first discuss Porter's contribution to this field and then visit other. In this book, Porter says that competitive strategy is the search for a favorable competitive position in the industry. Within competitive strategy are three core disciplines of (a) Industry analysis (b) Competitor analysis and (c) Strategic positioning of companies. Porter states that in essence, developing a competitive strategy is developing a broad formula on how to compete, what goals to set and what policies and tactics to pursue to meet them. In short, competitive strategy is a combination of the "ends" (goals) and "means" (operating and functional policies) to reach them. Porter goes on to describe that competitive strategy rests on two elements.

First : The attractiveness of the industry that the company is operating in. To formulate a competitive strategy, the relation of the company to its business environment must be understood. Porter says that the nature of the industry's structure determines the profitability within it. Forces within an industry are significant in influencing profitability, since they affect all the companies in the industry. Not all industries are equally profitable. Consider the passenger airline industry and the men's apparel industry. It is well known that airline carriers do not enjoy the same profitability as companies in the apparel industry. This, Porter argues is because of the way the industry is structured. In this context, Porter put forth a framework for analyzing the attractiveness of an industry called Michael Porters Five forces model. The five forces are (a) Threat of new entrants (b) Bargaining power of buyers (c) Threat of substitutes (d) Bargaining power of suppliers (e) Rivalry among the companies.

Second: In coping with the five competitive forces, Porter lists three generic approaches to strategy – (a) overall cost leadership (b) differentiation (c) focus. Each generic strategy puts varying demands of organizational arrangements, control procedures and incentive systems. Porter lists commonly required organizational skills and resources for each generic strategy.

Porter says that organizations which follow one of these three generic strategies can show above average performances in the long-term, while companies that are "stuck in the middle" perform less well. He defines stuck in the middle as a company's unwillingness

to make strategic choices and its attempts to compete by every means. In contrast to the authors who preceded him in the field of strategy, Porter is an advocate of the strategic positioning of a business in a given industry. This approach was novel in that previous authors in the area of strategy largely devoted their attention either to the elaboration of strategies or to strategic planning.

Porter's descriptive scheme of competitive strategy has found a widespread acceptance, which is evident from the wide range of applications that have been described in research literature. Although research shows that differentiation and cost leadership can co-exist, Porter suggests that each generic strategy requires a different culture and a different philosophy. He says the "strategic logic of cost leadership usually demands that a company be the cost leader." Several other researchers have expanded his generic strategies (Sumer & Bayraktar, 2012).

Most literature on strategy is in agreement that strategy must have three components – Objective, Scope and Advantage. The objective is a long term valuable position that the company may want to reach. Where is the business trying to get to in the long term? For this, the scope of the company is laid out. Which markets should the company compete in, what kind of activities should we involve in? What resources shall we need to obtain for this purpose? Strategic planning helps to take actions within a consistent framework. The result of a good strategy should be a position of advantage in the industry – how can the business perform better than the others in this industry? This is a competitive advantage that a business acquires in its industry. That a company has achieved a competitive advantage could be reflected in an above average return on invested capital in the industry. Thus returns in excess of what an investor can expect from this industry with similar risk, are considered as a result of strong competitive advantage.

Strategy and competitive advantage thus served to explain why companies with seemingly similar resources, skills and set of customers performed quite differently in profitability. A company can perform better than its competitors only if it can establish a positive difference in value to its customers - it could be better value at same prices or same value at lower prices. Delivering greater value allows a company to charge higher prices. Cost is generated by performing business activities in the company, while cost

advantage arises by performing these activities more efficiently than others. Taking this ahead, differentiation is achieved when the choice of activities and how they are performed offers greater value to customers. Choice of activities and how to perform them are questions best answered by strategy. Driven by that and the rapidly changing business environments and demanding consumers, companies have to find new ways to achieve a competitive advantage. This demands strategic frameworks and cooperation along the whole product life cycle are needed in order to deal with the changes in industry competitiveness a customer value.

3.4 Resource based view of Strategic Management in Companies

A resource-based view of strategic management (Wernerfelt, 1984) examines the resources and capabilities of companies that enable them to generate above-normal rates of return and a sustainable competitive advantage. The resource-based approach focuses on the characteristics of resources and the strategic factor markets from which they are obtained to explain company heterogeneity and sustainable advantage. Company decisions about selecting and accumulating resources are characterized as economically rational within the constraints of limited information, cognitive biases and causal ambiguity (Amit & Schoemaker, 1993). According to this view, it is the rational identification and use of resources that are valuable, rare, difficult to copy, and non-substitutable which lead to above average profits.

Resources, according to Wernerfelt (1984) are all tangible and intangible assets which are semi-permanently tied to an organization. Thus brand names, technologies, reputation, experienced employees etc. would all be resources for the company. These would form the base for competitive advantage for a company. Classification of resources was done by some researchers. Aaker (1989) writes that assets and skills are the basis of competition; Hall (1989) introduces the concept of intellectual assets or intangible assets as critical value drivers. Itami (Itami, 1987) defines invisible assets as information-based assets, which includes technology, consumer trust, brand image, corporate culture, as well as management skills. According to Itami they are the most important resources for long-term success because only invisible assets can be used simultaneously in several areas.

The resource-based view proposes that resource selection and accumulation are a function of both within-company decision-making and external strategic factors. Within-company managerial choices are guided by an economic rationality and by motives of efficiency, effectiveness and profitability. External influences are strategic industry factors that impact the company, including buyer and supplier power, intensity of competition, and industry and product market structure. These factors influence what resources are selected, as well as how they are selected and deployed. Therefore, from a resource-based perspective, sustainable competitive advantage is the outcome of discretionary rational managerial choices, selective resource accumulation and deployment, strategic industry factors, and factor market imperfections. Consistent with a strategic orientation, the resource-based view assumes that economic motives drive resource procurement decisions and that economic factor in the company's competitive and resource environments drive company conduct and outcomes.

Merely the endowment of critical resources cannot be directly related to a company's financial performance, since this also depends on the structure and attractiveness of the industry in which the business exists, and on the ability of the company to translate resources into capabilities and, subsequently, competitive advantage.

3.5 Other views on strategy

Pankaj Ghemawat's (Ghemavat, 2010) (2006) (1986) treatment of strategy is on the globalization of businesses. Ghemawat argues that the world today is not as "globalized" as many strategists believe, and that cross-border differences still matter in the world economy. He says that in a world that is neither truly global nor truly local, companies must find ways to manage differences and similarities within and across regions. Another influential strategy thinker Richard Rumelt (2011) has written about what is a good and bad strategy. He argues that a good strategy works by focusing energy and resources on one, or a very few, pivotal objectives whose accomplishment will lead to a cascade of favorable outcomes. One form of bad strategic objectives occurs when there is a scrambled mess of things to accomplish - what he calls a dog's dinner of strategic objectives, A long list of "things to do," often mislabeled as "strategies" or "objectives,"

is not a strategy. He argues that the essence of strategy is a clear and differentiated point of view that supports forceful and coherent action.

Kaplan and Norton (1992) introduced the Balanced Scorecard a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics to give managers and executives a more 'balanced' view of organizational performance.

3.6 Competitive Advantage

Competitiveness is a comparative concept of the ability and performance of a company, sub-sector or country to sell and supply goods and/or services in a given market. In almost all literature on strategy, the leading hypothesis is that sustained superior performance of companies arises from sustained competitive advantages (Powell, 2001). The hypothesis of competitive advantage has had significant influence on strategy research both in academia and in practice. Theoretical and empirical scholarly pursuits have resulted in literature attempting to identify, create and leverage competitive advantages in companies. Competitive advantage is universally accepted in strategic management courses at B-Schools.

Here too Porter's (Porter M. E., 1985) work has been influential. He argues that competitive advantage arises from the entire product life cycle of activities that a company is engaged in serving its customers. While competitive strategy focuses on an industry and what the company must do in that industry, competitive advantage concentrates on the company itself. To compete in an industry, companies undertake a wide array of activities from order booking, assembling products, training employees etc. These activities are smaller or narrower than departmental functions of R&D, marketing etc. These activities generate costs and also create value to its customers. These are the basic units of competitive advantage. Porter's view of competitive advantage is "activity based value". For this, Porter introduces the concept of value chain. The value chain of companies in an industry differs reflecting their strategies. In competitive terms, value is the amount the buyers are willing to pay for what a company provides them with. A company is profitable if the value it realizes exceeds the costs involved in creation of the product. Pankaj Ghemavat (Ghemavat, 2006) discusses two prerequisites of creating a

competitive advantage (a) company must configure itself to do something unique and valuable. Such that if it stops doing this, the industry should feel something missing since no one could replace it perfectly. (b) Competitive advantage comes from the full range of a company's activities.

Barney (2002) proposes that “a company experiences competitive advantages when its actions in an industry or market create economic value and when few competing companies are engaging in similar actions.” John Kay (1993) defines distinctive capabilities as ones derived from characteristics that others lack and which are also sustainable and appropriable. “A distinctive capability becomes a competitive advantage when it is applied in an industry or brought to a market.” Kay measures the value of competitive advantage as value added, with the costs of physical assets measured as the cost of capital applied to replacement costs. According to Singh et al (2010) a framework for competitiveness of an organization will depend on its assets, pressures, constraints, strategies for selecting competitive priorities and processes as well as performance.

OECD has defined it thus “Competitiveness is the capability of companies, industries, regions, nations and supranational regions to create a relatively high income factor and relatively high employment levels on a sustainable basis, while permanently being exposed to international competition.” (OECD, 1994). Competitiveness of an organization can be influenced by external as well as internal factors. Internal factors are material and energy prices, quality of manpower, R&D and technical capabilities, logistic management and other processes whereas external factors are potential new entrants, substitute product, bargaining power of the buyers and bargaining power of suppliers (Porter M. E., 1985). In addition to this, other factors may be government policies, capital resources, availability of technical manpower and infrastructure of roads, communication and energy.

The search for a sustainable competitive advantage will never cease. Newer market forces like globalization and digitization will ensure that competitive advantage will be a moving target. What is an advantage today may not be so tomorrow.

3.7 Review on the value of strategic planning for SMEs

There is significant research contribution on strategy and competitive advantage in SMEs. Due to its small size, SMEs outnumber larger companies in most countries. They are generally suppliers to large companies providing them with products and services. Regardless of their size and industry, these small companies also face an overwhelming competition. In the era of globalization, the SMEs competitor could be a large company from across the planet. Shortening of product life cycles put pressure of companies to constantly improve products. All this means that identifying and adopting sustainable competitive strategies is therefore a constant need in SMEs.

While several researchers have attempted to contribute to the discussion of the value for SMEs in adopting strategic planning, the studies seem to be contradicting. It is often asserted that strategic planning is essential for a small and large business for no other reason than that it helps them to take better advantage of the opportunities which lie in the future and to forestall the threats that it contains (Steiner, 1967). Bamberger (1980) noted that there is a positive relationship between the existence of a more or less formal strategic planning and the company's growth. A number of studies show that SMEs which engage in strategic planning are more likely to achieve higher sales growth, higher return on assets, higher margin on profit and higher employee growth (Carland & Carland, 2003) (Gibson & Casser, 2005). Also, SMEs engaged in strategic planning are more likely to be more innovative, have more intellectual property, employ new processes and technologies and achieve international growth (Upton, Teal, & Felan, 2001) (Stewart, 2002) (Beaver & Prince, 2002). Literature findings generally support the contention that there are greater advantages in adopting strategic planning than not planning.

Piest (1994) offers an explanation for this contradiction – he says that this could be a result of using different methodologies and the different ways in which the concepts of strategy were put in operation. As per Piest, some researchers have used objective indicators to measure strategic dimensions, while others did not so so. Researchers who are in contradiction have measured different dimensions of planning. Balasundaram

(2009) published a metastudy of literature concerning SMEs and the adoption of strategic planning process (Table 1)

Table 2: Metastudy by Balasundaran (Incidence of Strategic Planning in Small Business: An Overview, 2009)

Authors	Findings
Schwenk and Shrader (Schwenk, 1994)	Strategic planning has a positive effect on the performance of small businesses.
Orpen (Orpen, 1993)	Formal strategic planning enables an organization to better prepare for and to deal with the rapidly changing environments that most of them face.
Lyles et.al. (Lyles, 1993)	Small business owners adopt a more formal planning process, the breadth of strategic planning can most certainly influence the growth of the company
Gibb and Scott (Gibb, 1985)	The study of the data reported here that most owner- managers of small companies have ideas or portfolio of ideas of projected action to avail themselves of relevant opportunities and for dealing with the threats existed in the environment.
Mintzberg and Waters (Mintzberg H. W., 1985)	They indicated that although owner-managers are aware of relevant events in the environment, although they have strategic course of action to exploit the opportunity or to deal with the threats in it, and although they are aware of the implications of their strategic courses of action, such deliberations are reactive and seldom formalized.

Singh et al (2010) have compiled the major challenges to competitiveness for SMEs from a review of literature. Resource scarcity, lack of expertise, demand on multiple technological competencies are some of the major ones cited by them. The above table

suggests that most of these challenges can be met by adopting a strategic planning process.

According to Porter (1985) company's strategy must match organization resources, changing business environment and in particular changing customer needs. A company's competitive strategy would specify the company's products, markets and long term objectives. Building core competencies thus becomes essential for long term competitive advantage, since advantages stemming from the product price-performance tradeoff will be short term (Kak & Sushil, 2002).

3.8 Strategy and strategic planning practices in SMEs

Owing to resource limitations, SMEs cannot devote time and effort towards strategic planning.

In contrast to larger companies, SMEs normally maintain a lower level of resources, have more limited access to human, financial and customer capital, and lack a well-developed administration (Kraus Sascha, 2007). Research has consistently shown that most SMEs do not engage in strategic planning (Sexton & van Auken, 1985) (Beaver G. , 2003). Many decision-makers in SMEs are saying that entrepreneurs do not plan (Posner, 1985) instead they use their limited time for operational and sales activities (Kraus Sascha, 2007). Formal planning is often regarded as limited to large enterprises and thus not transferable to the requirements of the fast-moving and flexibly-structured SMEs. SMEs tend to be biased to short term operational issues rather than long term strategic ones. Many studies also show that strategic planning in SMEs can be more reactive than proactive (Stonehouse & Pemberton, 2002) (Mazzarol, 2004).

Some studies have found that strategies in SMEs are driven by technology (Chanaron & Jolly, 1999). While technology can provide a competitive advantage, this can be short-lived. Singh et al (2010) have listed out the pressures that SMEs in India are subjected to, with their relative ranks. This seems to be important finding from the perspective of strategy formulation, since this can potentially help SMEs to set their priorities before the planning process (Figure 1)

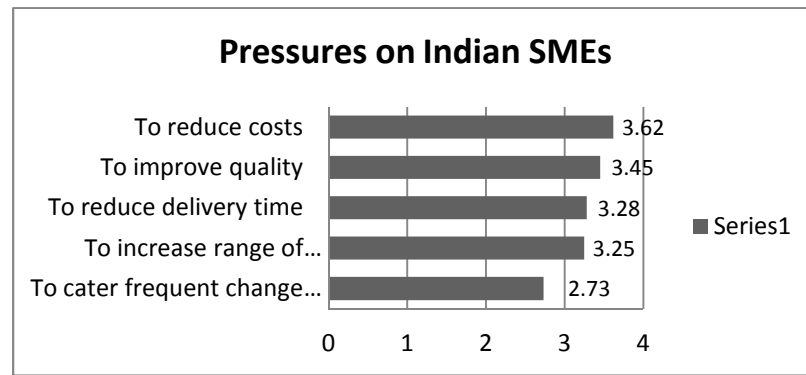


Figure 6: Pressures on Indian SMEs (Singh, Garg, Deshmukh)

Competitive priorities are the goals that guide business strategy and decisions of resource allocation. Lagace & Bourgalt (Lagace & Bourgalt, 2003) have suggested linking manufacturing improvement programs with the four widely accepted competitive priorities of quality, cost, delivery and flexibility.

The MSME Prime Minister's Task Force Report (2010) makes a list of common problems across industries which MSMEs in India face. They are as follows:

1. Lack of availability of adequate and timely credit;
2. High cost of credit;
3. Collateral requirements;
4. Limited access to equity capital;
5. Problems in supply to government departments and agencies;
6. Procurement of raw materials at a competitive cost;
7. Problems of storage, designing, packaging and product display;
8. Lack of access to global markets;
9. Inadequate infrastructure facilities, including power, water, roads, etc.;
10. Low technology levels and lack of access to modern technology;
11. Lack of skilled manpower for manufacturing, services, marketing, etc.;
12. Multiplicity of labour laws and complicated procedures associated with
13. compliance of such laws;
14. Absence of a suitable mechanism which enables the quick revival of viable
15. sick enterprises and allows unviable entities to close down speedily; and
16. Issues relating to taxation, both direct and indirect, and procedures thereof.

All these problems are operational in nature and tend to be correlated to the size of the company. Although these problems leave the company weaker in competition, none of these are strategic in nature. Consequently, the SME head would spend more time on managing operational issues than undertaking strategic planning for the future.

In spite of their sizeable contribution to national GDP, SMEs have a higher failure rate and poorer performance levels than large companies (Jocumsen, 2004). The Business Statistics Office (UK) reports that “60 per cent of small businesses fail in the first three years of existence”. While in the United States, eighty percent of all startups close down within their first five years. It is widely accepted that a robust SME sector helps build employment, contributes to the nation’s GDP and can bring in foreign investments. This seems to be at odds with normative literature which prescribes that companies should actively plan for their future and make choices based on their capabilities, strengths and opportunities in the marketplace.

3.9 Competitive advantage in SMEs

The ability of SMEs to create, access and commercialize new knowledge in their own markets is fundamental to their sustained competitiveness. The formation of strategy and its implementation are at the core a competitive business. Yet, defining competitive advantage or competitiveness has also been a challenge for researchers and practitioners alike. In most of the studies, competitiveness of an organization is analyzed in terms of certain financial parameters but according to Man et al (2002), Competitiveness of SMEs should comprise the four major constructs relating to the company’s internal factors, external environment, influences of the entrepreneur and the company’s long-term performance.

Kaplan and Norton (1992) proposed the concept of Balanced Scorecard (BSC) as a means of reflecting and evaluating intangible assets in performance evaluation, and as a basis for performance evaluation measures in the practice of strategic goals. In BSC a performance evaluation indicators enable the implementation of strategies and adaptation

to competition, markets and changes in technological environment. Since balance is fundamental to the BSC conception, it makes sense to SMEs. BSC focuses on the four pillars of any business – the financial perspective, internal business perspective, innovation and learning perspective and customer perspective, and the balance between financial and non-financial aspects, between long-term and short-term goals, between internal factors and external factors, and between results and causal driving indicators.

SMEs do not enjoy the benefits of scale, nor can they invest in human resources to strategize and plan for competitive advantage. Thus it is all the more important that an SME is able to relevant understand and define competitive advantage relevant to his company.

- (a) The company's products are bought at a 'lower price' while the company enjoys industry standard profitability. By lower price it is not the absolute lower price in an industry, but when a customer would have to pay more for other products of a similar value. For example when Kirloskar introduced the lathe machine in India at a time when lathes were imported from other countries, Kirloskar built the same value in the lathes while offering it at lower prices. Similarly when Tata Ace was introduced in the three wheeler transport vehicle market, the price was higher than the existing products, but value offered was much more. This pulled in customers from the three wheeler segment.
- (b) The company's products are of unique value to customers and not substituted by the other products in the industry. If for some reason the company's product is not available to customers, then the customers may need to buy some other product at a lesser functionality or value than this.
- (c) The company offers differentiated value not captured in a physical attribute. For example investment in relationship, building trust, dependability, customer responses, providing advise etc. It could also be a mix of any of these, which locks-in customers even when they have a same value lower price option.

3.10 Review of literature on Green SMEs

By definition, an SME has operations on a small scale and correspondingly small impact on the environment. Some studies suggest that SME owners believe this (Lee K. , 2000).

While the individual environmental impact is small, their collective impact may be about similar, if not more (Hobbs, 2000). While there are various schools of thoughts within the scope of green SMEs, most researchers agree that there is enough scope for improvement of SME's environmental performance. There is also a general consensus that green practices of large companies, which are well studied, may not be appropriate for SMEs due to resource constraints and lack of awareness (Hitchens, 2004).

Some studies suggest that SME owners/managers are largely unaware of current environmental standards (Gerrans & W.E., 2000) and may not be sure if they understand the relevant legislation (Williamson, Lynch-Wood, & Ramsay, 2006), this offers an explanation for the low level of green practices. The lack of awareness of legislation may cloud companies from realizing the full impact of their activities on the environment (Simpson, Taylor, & Barker, 2004). Hillary (2004) proposes that barriers in SMEs can be classified as internal and external. Internal barriers like awareness and attitudes of the SME owner could be a major contributor. Some studies point that positive attitudes alone are not enough to produce behaviours consistent with the attitudes (Nafziger, Ahmed, & Montagno, 2003).

Substantial research is available on green practices of SMEs from several countries – European Union, Taiwan, UK, Hong Kong, New Zealand, Malaysia, Korea and Sri Lanka (Chen & Lai, 2006) (Megacom, 2008) (Ortiz Avram & Kühne, 2008) (Lee K.-H. , 2009) (Weerasiri & Zhengang, 2012) and across various industries. This has contributed to our understanding of green behavior of small companies by identifying the motivators (Smith & Duff, 2000) (Moorthy & al, 2012), enablers (Gadenne, Kennedy, & McKeiver, 2009), barriers (Iraldo, Testa, & Frey, 2010), practices, environmental technologies they employ (Shrivastava, 1995) (Hobbs, 2000), strategies (Orsato, 2006) (Fischer & Schot, 1993) (Porter & van der Linde, 1995) and what competitive advantages (Porter & van der Linde, 1995) (Ghemavat, 2006) a company could stand to gain.

Several papers were reviewed which studied why companies in general and SMEs in particular go green. Bansal and Roth (2000) have identified three key motives of competitiveness, legitimation, social responsibility which motivate companies. They talk

about how ecological responsiveness has the potential to improve long-term competitiveness of companies; how companies are driven by the desire to improve the appropriateness of its actions within a legal framework and how companies are driven by the motivation of doing social good. Some other researchers have suggested other motives too – stakeholder pressures, top management initiatives, and environmental risks (Dillon & Fischer, 1992) (Lampe, Ellis, & Drummond, 1991). The Australian government has published a report on the emerging green consumers (2011), while the UNEP report discusses how environmental performance of companies is a growing concern among customers (UNEP, 2012). Azzzone et al (1994) suggest that various forces are emerging in the market place – green consumers, pressure groups, green investors and insurance companies. All these exert varying pressures on companies to reduce their environmental impacts and use environment friendly technologies to produce less impacting products. He argues that these forces do not accept a reactive approach to green performance.

Lowering material consumption, energy and waste results in saving costs and helps the environment, while investments with no such promise may be overlooked (Esty & Winston, 2009). Similarly, a clean technology may be unattractive if it cannot reduce costs. These are suggested to be dependent on the level of awareness of the company owner. For some companies, environmental performance puts a financial burden (Williamson, Lynch-Wood, & Ramsay, 2006) (Simpson, Taylor, & Barker, 2004), while others are too busy with operational issues. Application of funds to green practices diverts them from mainstream business activities to less productive (or even non-productive) activities. This acts as a barrier for in some SMEs. Limited managerial capabilities of SMEs are also well documented. It is suggested that management practices within SMEs focus on operational issues rather than strategic objectives. Issues of productivity, competitiveness, labour and cash management are uppermost since managerial abilities may not match the business demands (Gelderen, Frese, & Thurik, 2000) (Bognanno, 2012) (Bianchi & Noci, 1996) (Walker & Brown, 2004), their priority for green performance may be low. Bianchi et al (1996) suggest that proactive environmental behavior is growing in importance due to various stakeholder pressures, but may not be met with managerial resources required to embrace it. Rangone (1999)

says that SMEs may have a mono-dimensional strategic intent. On similar lines, the Deloitte-CII Report on SMEs in India (2008) reports that SMEs are incapable of integrating environmental management and corporate responsibility into business strategy.

On attitudes, Petts et al (1999) suggest that focus on individuals and an understanding of the relationship between attitudes and behaviour within businesses is essential to implementation of effective sustainable development and self-regulation policies. Their research suggests that the environment is important to individuals and that environmental compliance is regarded as 'the right thing to do'.

Numerous studies identify barriers that SMEs face in improving their green performance (Hillary, 2004) (Simpson, Taylor, & Barker, 2004) (Gibson & Casser, 2005) (Revell & A, 2007) (Ortiz Avram & Kühne, 2008) (Iraldo, Testa, & Frey, 2010). Among the most common is the lack of time. The other common barriers are : limited resources financial and others, limited managerial capabilities, unattractive return on investment, diverting business focus, lack of skills, pressures of time, competitive pressures, low awareness and knowledge, lack of absorptive capacity, lack of government support and no recognition from customers.

Similarly, the influencers are identified (Bansal & Roth, 2000) (Gadenne, Kennedy, & McKeiver, 2009). The positive influencers which show up in many studies are: personal awareness, customer demand, social pressures, economic benefits and improving company image.

A number of researchers conclude that SMEs lag in environmental practices when compared to large companies (Studer, Welford, & Hills, 2008). Most are agreed that SMEs are motivated more by compliance and cost saving than gaining a competitive advantage (Rowe & Hollingsworth, 1996) (Worthington & Patton, 2005)

Papers in the Indian context were conspicuously lacking. Some countries have done extensive research and gained in the process. OECD in particular has published several studies done over the last few years, on SMEs in the European Union (Mazur, 2012)

(OECD, 2011) (OECD, 2007). Such reports have helped frame SME specific policies which benefit the nation and its citizen.

A short summary of the key findings are enumerated in Table 3.

Table 3: Key findings from the Literature Review

Key findings in the review	Indicative authors
Multiple operational issues challenge the managerial capabilities of the SME.	(Bianchi & Noci, 1996) (Walker & Brown, 2004) (Bognanno, 2012)
The environmental performance of a company is correlated to its size.	(Gerstenfeld & Roberts, 2000) (Lewis & Cassells, 2010)
SMEs may be largely unaware of current environmental standards.	(Gerrans & W.E., 2000)
Display lesser awareness.	
Unsure if they understand legislation.	(Williamson, Lynch-Wood, & Ramsay, 2006) (Taylor & all, 2003)
Companies with Owners with greater level of awareness are more likely to have a higher level of environmental practices.	(Gadenne, Kennedy, & McKeiver, 2009)
SMEs focus more on short-run outcomes than longer run objectives.	(KPMG, 1997)
Unidirectional strategies.	(Rangone, 1999)
Incapable of integrating environmental management and corporate responsibility into business strategy	Deloitte-CII Report on SMEs in India (2008)
Environmental performance puts a financial burden on SMEs.	(Williamson, Lynch-Wood, & Ramsay, 2006) (Simpson, Taylor, & Barker, 2004) (Revell & all, 2009)

Cost reduction is a major driver for environmental improvement in SMEs.	(Bansal & Roth, Why Companies Go Green: A Model of Ecological Responsiveness, 2000) (Chen & Lai, 2006) (Bianchi & Noci, 1996) (Simpson, Taylor, & Barker, 2004) (Lewis & Cassells, 2010)
SMEs do not consider their own environmental impacts as substantial.	(Chen & al, 2006) (Weerasiri & Zhengang, 2012)
Various interventions suggested for improving environmental performance.	(Hillary, 2004) (Hitchens, 2004) (Parker & all, 2009) (Gadenne, Kennedy, & McKeiver, 2009)
SMEs exhibit three types of behaviour – positive attitude, compliance only attitude, negative attitude.	(Clarke, 2004)
SMEs do not face significant external pressure to implement environmental practices.	(Revell & all, 2009) (Jenkins, 2006)
Strategic green practices can lead towards a competitive advantage	(Hart, 1995) (Worthington & Patton, 2005)
SMEs were unable to gain a competitive advantage by adopting environmentally good practices	(Simpson, Taylor, & Barker, 2004)
Role of universities, students and SME professionals to foster practices.	(de Eyto & all, 2008) (Lukman & all, 2009)
Potential for sustainable literacy to be added as a skill for entrepreneurial development	(de Eyto & all, 2008)
Pro-active green strategies are difficult for SMEs due to limited resources and skills and that they cannot be justified economically.	(Bianchi & Noci, 1996)
Well designed environmental regulations can lead to improved competitiveness for companies	(Porter & van der Linde, 1995)
Performances of green product innovation and green process innovation are positively associated with corporate competitive advantage.	(Chen & al, 2006)

A company can be successful only if it is able to select an environmental strategy that is consistent with the characteristics of the context within which it operates.	(Azzone & Bertele, 1994)
EU SMEs will benefit from technical support, economic support and simplification of systems specific to SMEs	(Iraldo, Testa, & Frey, 2010)

In general there is an agreement among researchers about the potential for improvement in SME's environmental performance. Hitchens (2004) points that green practices of large companies which are well studied but not be appropriate for SMEs due to resource constraints and lack of awareness.

Chapter 4

Research Methodology

Chapter 4 - Research Methodology

4.1 Introduction

Research is a process of systematic investigation or inquiry into a specific problem or issues, with the intent of being led to new or improved knowledge on it. Primary research on the other hand is the study of the problem or issue at hand through direct observation or investigation. There are many approaches that such systematic investigation can follow. The methodology used for this particular research employed both qualitative and quantitative techniques. While the qualitative approach has less degree of control and could be prone to generalization, nevertheless, this forms a foundation for further quantitative research, helping frame questions more pointedly. A qualitative approach tends to use thoughtful reflection and analysis of verbal and written content (Burns & Burns, 2008). A theory or model can be proposed at this stage, which explains the relationships between abstract concepts and allows for generalizations based on individual situations and facts.

In this particular research, a conceptual framework is proposed, based on prior research and from in-depth discussions with large companies and small companies. The conceptual framework was used as the starting point for the quantitative questionnaire. Based on this framework, a questionnaire was designed, which was circulated to the owners of SME companies in Pune region. The questions covered the various stages of the product life cycle and inquired about green practices. Complying with environmental regulation is mandatory by law, and is hence assumed. This is where the company has no control other than to implement and meet the prescribed norms. Since all companies are expected to comply, this means that a company can differentiate only by going 'beyond compliance'. This research attempts to understand the business benefits gained from green practices followed by SMEs. The research was conducted with the help of the conceptual framework.

Since this research was funded by the researcher himself, the sample chosen was limited to the Pune region, budget being a constraint. This choice was suitable considering that the researcher alone would work on this. The research conducted is summarized below

- **Design** – Qualitative research formed the exploratory part of the design. This was followed by quantitative empirical research conducted with SME owners from Pune region. The definition for SMEs employed was as per the MSMED Act of 2006 of the government of India.
- **Instruments** – In the exploratory part, 4 interviews were recorded using a digital recorder. Detailed notes were taken down during each of the indepth interviews. For the quantitative research, a questionnaire was prepared. The questionnaire was developed with a paid online service called Surveymonkey.com. The survey was available for online response as well as on print. All the data were recorded online in the Surveymonkey website.
- **Analysis** – Data collected on Surveymonkey was edited manually in Microsoft Excel. This was then analysed with the help of Microsoft Excel and SPSS 13 statistical package.

The research methodology followed is depicted in Figure 7

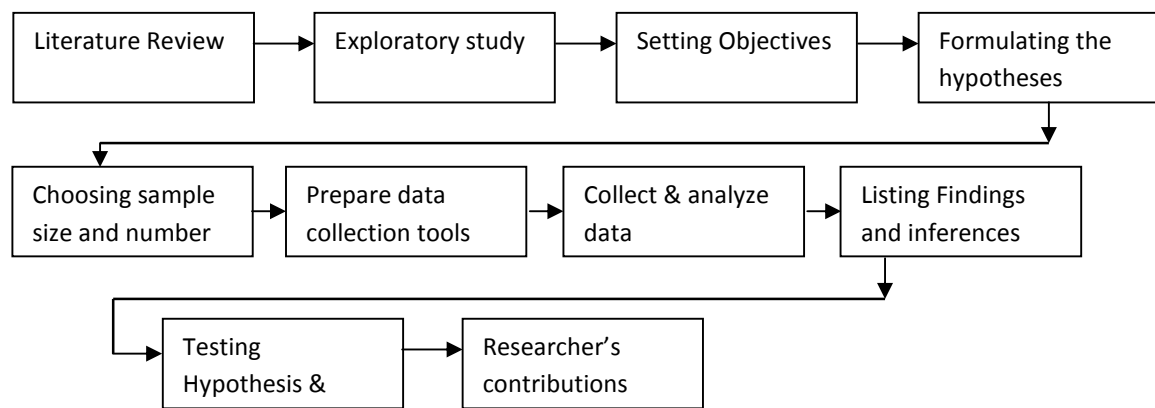


Figure 7: Research Methodology

4.2 The Exploratory Study

Upon completion of the literature review, exploratory studies were undertaken. Exploration is useful when the research is in initial stages and has to yet clarify the research objectives. The exploratory study can be divided into three parts. (i) Secondary data of various large companies was accessed and studied. Large companies are generally supported by an SME vendor base. Large companies as customers offer SMEs business

which is customized and as a result very prescriptive. It was thus considered it important to understand the environmental sustainability practices of large companies, since they would have a better understanding and more competent resources because of the sheer size of operations. Further, it was assumed that large customers could be strong influencers for SMEs to improve their own environmental performance, in much the same way that they influence quality practices. Accordingly, 5 large companies were visited and their green practices studied for the purpose of this research. The companies studied and the persons met are listed below.

- a. Persistent Systems Limited. S.R.Joshi, Consultant. Meeting date - 22 March 2013.
- b. Kimberley Clark Lever. Sanjay Kachare, Head Operations. Meeting date - 22 March 2013.
- c. Cummins India Limited. S. Ravichandran, Head CSR. Meeting date 28 - March 2013.
- d. Godrej & Boyce Mfg. Co. Ltd. H.N.Daruwalla, Executive Vice President & Business Head. Meeting date – 2 April 2013.
- e. Kirloskar Brothers Limited. Nishikant Ingle, Head of Quality & Environment. Meeting date – 4 April 2013.

In all the meetings, a semi structured in depth interview was conducted with the contacts. Questions were asked about history of green practices, current practices, motivations for them and whether a strategic focus was placed on environmental concerns. They were also asked how they saw themselves competing in their respective markets, based on green positioning.

(ii) In the second part of the exploratory study, a two-day visit to the CII Sohrabji Godrej Green Business Centre (CII-GBC) at Hyderabad was undertaken. The CII-GBC has been doing seminal work in research, policy and implementation of green business practices for the Indian industry. Two meetings were conducted in this centre by the researcher, resulting in a deep understanding of green practices for industry. The persons met and the broad discussions are as below:

- a. K.S.Venkatagiri, Principal Counselor. Mr. Venkat leads the team which is formulating the “GreenCo Ratings” for industry. This is a system for evaluating

the “greenness” of a company. An indepth understanding of the GreenCo rating was given by Mr. Venkat. The rating covers the following aspects of green practices – Energy, Water, Renewable energy, Waste, Material, Supply chain, GHG, Products, Life cycle assessment. The rating systems helps a company measure its competitiveness through profitability from green practices. An understanding of this rating system helped in formulating the conceptual framework for the questionnaire.

- b. N,Muthusezhiyan, Senior Counselor. Mr. Muthu explained the CII Mission on Sustainable Growth (MSG). This was initiated by the then head of CII, Mr. Jamshyd Godrej. In 2007, together with the National Council, CII formulated the MSG. The core purpose of the Mission is to "promote and champion conservation of natural resources in Indian Industry without compromising on high and accelerated growth". This consists of ten ‘natural capital commandments’ which have measurable targets. Companies have signed up for this charter and practice the commandments. This too was useful in formulating the conceptual framework.

(iii) The third part of exploratory studies comprised of qualitative research with SMEs themselves. Qualitative methods are less structured and more intensive than standard questionnaire based models. Qualitative interviews can be longer and offer a flexible relationship with the respondent. This can result in data with more depth and with a greater potential of new insights. Since time taken is much longer here, the number of respondents is far less, but more time is spent with each. The most common sources of data collection in qualitative research are interviews, observations, and review of documents (Creswell, 2006).The methodology is planned and pilot-tested before the study. Creswell (2006) places the data-collecting procedures into four categories: observations, interviews, documents, and audiovisual materials. He provides a concise table of the four methods, the options within each type, the advantages of each type, and the limitations of each. In-depth interviews were chosen for discussions with four SME owners. Here again the technique of semi-structured interviews was employed. Conversations with 4 owners were digitally recorded and notes were made for all the

interviews. The list of SME owners contacted for the exploratory studies and company names are as follows:

Table 4: Sample company names for exploratory studies

SME company	Respondent's name & designation	Products
Industrial Electronic and Allied Products	Madhav Bhate, M.D.	Electronic and mercury based Blood pressure monitors
Deval Electroplaters	Pariksheet Deval, Partner	Electroplating services for industries
Atul Electro Formers Ltd.	Nitin Kibe, M.D.	Filter screens for sugar processing
Keetronics India Pvt.Ltd.	Rajesh Kulkarni, M.D. Swati Gokhale, M.R.	Membrane keyboards for instrumentation

4.3 Findings in the Exploratory Study

4.3.1 Findings from Exploratory Study in large organizations *Persistent Systems Limited.*

A meeting was conducted with Mr. S.R.Joshi who retired as the Environmental Manager from Persistent and now works with them as a Consultant. This meeting yielded many insights on the activities that Persistent has undertaken. Persistent Systems have been following green practices in their offices. They follow the CII Green Building norms and have invested in cleaner technologies. Efforts are made to reuse and reduce water consumption and older HVACs are retrofitted to save energy. Reduction in number of printers and consolidation of server rooms has helped save energy. They also manage their server rooms more efficiently by a purpose built software developed by themselves. Training and awareness about the environment is built into their employee training calendars. The key insight from this visit was when they asked were about the motivation for these efforts. Mr. Joshi said that the vision of the founder (Anand Deshpande) was the strong driver for these efforts. Mr. Deshpande's environmental awareness and empathy played the key role in Persistent's efforts. Mr. Joshi said that they did a return on investment analysis before investing, but there was no particular cut off that the

investment should pay within. This was clearly a top-down approach; nevertheless, further enquiries indicated that there was no strategic focus embedded in the business activities of the company. Persistent surely went beyond compliance, but did not integrate the efforts into mainstream business. The business benefits are mainly savings in energy and water use. The clean technologies employed are expected to start paying within 2 years. They do not communicate any of these efforts to clients, neither in brochures, nor discussions nor website. Thus, they have not enjoyed any preferential treatment from clients or prospects because of their 'green' inclinations.

Kimberley Clark Lever. This company has a diaper converting unit in Shikrapur near Pune. A meeting was conducted with Mr. Sanjay Kachare, Head Operations. KC worldwide have a metric called the Global Index of Energy, which is based on the energy consumption to produce 1000 diapers. The Indian company scores very low in this index and hence has made several investments to improve their score. Few years back, these operations were at a score of -23 while today they are at -4. Green activities were driven by savings or reduction in their global index target. There were no local targets and none of the activities seemed strategic nor were they following any long term goals. When enquired about the waste generated from consumption of their products (diapers), they did not think this was in their purview as of now. The researcher brought up the point that diaper waste was a growing international concern and had stringent laws in many European countries. In absence of any norms in India, they did not consider it their responsibility. This Indian operation followed their international directive of local compliance and reporting, but did not have anything beyond that.

Cummins India Limited. This is a large US corporation, and one that has clear sustainability efforts and targets in the US. Being headquartered in Pune, the Indian arm was visited by the researcher and Mr. S. Ravichandran, Head CSR was met. The company started as a joint venture with the Kirloskar group and hence they have a deep understanding of Indian culture. This is seen in their CSR activities which connect with the relevant issues of woman empowerment and rural problems of health and water. Mr. Chandrasekhar Kulkarni is the HSE (Health, safety and environment) leader, and his team is responsible for environmental activities in all Plants in India. Their focus started

with savings, but now has more of the sustainability initiatives that are beyond savings. The sustainability practices at Cummins are guided by the ACE team which stands for Action Committee for Environmental Sustainability. The six areas which are monitored are (i) Reduction of green house gases (ii) Zero Disposal (iii) Use of renewable energy (iv) Building design (v) Environmental impacts of purchasing and (vi) Minimizing carbon in transport. The team meets every month and reports to the CEO. The manufacturing plants at Ranjangaon and Phaltan are both green sites with IGBC Gold rating. Every unit has a scorecard which is maintained through self-assessment. They are working out green supply chain practices which may come into force in the near future. Another initiative is their Recon division which reconditions old Cummins engines, to increase life. This potentially cannibalizes their engine business, but benefits the environment by saving new resources and benefits the company by getting business in reconditioning. While Cummins India follows their corporate environmental directives, they also have their own India specific efforts which seems to have paid off.

Godrej & Boyce Mfg. Co. Ltd. This is a home grown, family owned corporation into multiple businesses. Mr. H.N.Daruwalla, Executive Vice President & Business Head was meet, along with Mr. Burzin Wadia, Head of Operations Shirwal Plant. The meeting happened at their Vikroli, Mumbai office, and was followed up by a visit to their Shirwal plant to see the efforts which were discussed at Mumbai. This is one company which seems to be ahead of its times in environmental sustainability efforts. For example, Godrej Appliances launched India's first fully green refrigerator in 2002, and to date Godrej is the only company to have such a product. Their furniture division, Interio, has a BIFMA certification which was the first in Indian furniture manufacturers. Their new range of air conditioner has a 7 star rating – ahead of what competition has on offer in India. Godrej & Boyce received the Leader in Energy Efficiency & Sustainability Award. Building on history, Godrej launched its formal sustainability initiative, called “Good and Green,” in 2011. Developed together with the global consultancy company FSG¹, the Good and Green program is a strategic plan to identify ways to create social impact and align the company’s business opportunities. This long-term vision for of a more inclusive and greener India has three categories - (a) ensuring employability – aiming to train 1

¹ <http://www.fsg.org/tabid/192/ArticleId/460/Default.aspx?srpush=true>

million rural and urban youth in skilled employment (b) creating a greener India by making its manufacturing operations more sustainable, (c) innovating for good and green products with the ambitious aim of having a third of their portfolio made up of good/green products. The Good and Green program is strongly visible across their offices and plants. Every Godrej group entity contributes towards the Good and Green goals by setting targets, measuring and reporting. Between 2010-11 and 2011-12, Godrej reduced energy consumption by 6.2% (compared to a target of 4.5%), and reduced waste generation by 17.6% compared to a target of 4.1%. Water consumption, however, was reduced by only 1% compared to a target of 5.8%. As of 2011, rainwater harvesting allowed recharge equal to 15% of water use, consistent with the target and on track for an increase to 71% by 2015. They also subscribe to the CII Mission for Sustainable Growth “MSG” program. One of their objectives is “Having a third of our portfolio revenues comprising good and/or green products and services – defined as products that are environmentally superior or addresses a critical social issue..” . Thus their green practices do not focus only on short run savings. Their Reduce-Reuse-Recycle program has prompted them to look for sustainable recyclable packaging, even when it does not result in savings.

Kirloskar Brothers Limited. This is an Indian large company, part of the Pune based Kirloskar group, which makes water pumps for various industrial, agricultural and process applications. Mr. Nishikant Ingle, Head of Quality & Environment was met and he gave the researcher an overview of KBL activities in environmental conservation. Here again, the green activities are those which have helped save costs. For example, within the group there is an energy saving competition for the last 22 years and they have invested in wind energy. Recently, KBL commissioned E&Y to audit their sustainability report, which is a step towards a strategic approach. After this, they have been studying green supply chains and will implement this in the near future. KBL has signed the CII-GBC Mission for Sustainable Growth charter. In the next year, their first ‘green’ product will be on sale – a solar water pump. They will also roll out a “product reuse” scheme. KBL’s efforts thus suggest a steady shift from green activities to a green strategic focus, however, the benefits may not be realized in the short run.

Based on the meetings and insights from these large companies, a matrix was prepared.

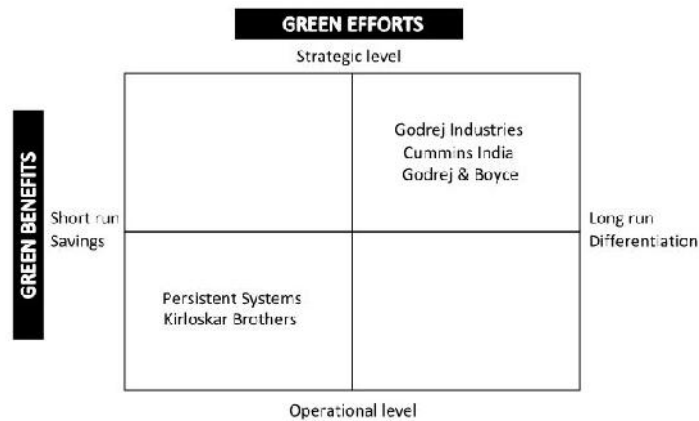


Figure 8: Findings from exploratory study with large organizations

In this, the company's green efforts are plotted against the green benefits realized. The matrix for these five organizations is depicted in the figure below.

Godrej clearly enjoyed the 'green' positioning with customers. This was a position which cannot be claimed by any of its current competitors – LG, Samsung, Sony, Videocon. Thus this is a distinct position and one that has the potential to offer a competitive differentiation. Cummins India is also following these steps and has a strategic focus which guides the sustainability activities.

Persistent and KBL on the other hand are more operationally focused, which do not offer the benefit of differentiation, since most competitors pursue such activities, or can easily pursue them.

4.3.2 Findings from Exploratory Study in SMEs

Industrial Electronic and Allied products make Diamond brand blood pressure instruments. The interview was with Mr. Madhav Bhate, founder and MD of the company. This company is 49 years old and a pioneer in blood pressure instruments. They use mercury in the blood pressure monitors. This is a toxic substance and thus their industry is closely watched by the pollution control board. In India, there are not more than about 5 BP instrument manufacturers. All of them use mercury in their instruments. This metal is banned in many countries, but not yet in India. Most also have electronic meters which are made in China and branded by the manufacturer and sold here. Diamond was the first manufacturer in India and has a reputation for quality and

reliability. Thus Diamond is a strong brand with doctors and hospitals. Over the last two years, IEAP has reduced its mercury based monitors to about 50% of their output. The rest is electronic monitors. IEAP imports some components and modules of the electronic monitors and manufactures the rest in their own factory. They assemble it and test it and provide warranty. Hence their electronic meters have an edge and a strong differentiation.

They actively promote electronic meters over mercury with the environmental message. They have incorporated “Go Green – stop using mercury” communication in their brochures and strongly position mercury as an environmentally harmful substance. This has helped them in several large hospitals, which have already decided to stop buying mercury products. Mr. Bhate gave the example of Sahyadri group of hospitals, Mangeshkar Hospital and several others. Also, some northern states have banned mercury monitors and IEAP stands to gain an advantage in these markets.

IEAP has set a target to stop mercury monitors in the next three years. In the discussions with Mr. Bhate, it came out quite clearly that their environmental approach of reducing production of mercury based monitors benefitted them. They were the first to bring locally assembled electronic monitors. Along with this, they communicated the environmental ban on mercury and promoted electronic monitors aggressively. This helped them the first mover advantage in their market and they had products locally assembled, tested and serviced, when their competitors could only import and supply.

Mr. Bhate also said that the pollution control boards have officers who do not really understand the environmental implications of industry. He said: *“The MPCB does not even know that we use mercury!”*

Deval Electroplaters undertakes electroplating services for customers. They use cyanide in their process which is hazardous. Yet in their 35 years, there has been no case of harm to any of their employees, since they take great care. They are strongly focused on environmentally friendly practices. The partner Mr. Pariksheet Deval said :

“In our business green practices add costs, but the saving results for the environment and hence we follow them. Our costs are higher, but we do not hold back. We only service clients who are ready to pay for such

environmentally safe practices. Thus we really do not have any competitors”.

Thus they need not practice environmentally harmful practices to gain business. They have invested in air scrubbers and an effluent treatment plant. They sell off their sludge to licensed vendors only. Mr. Deval strongly feels that many environmental rules do not understand the SME size and constraints. He gave the example of sludge collection. Their vendor comes to collect the sludge only if there is sufficient quantity, few hundred kilograms. But Deval Electroplaters generates only about 5 to 10 kgs per month. Thus they have to store it and keep which is hazardous. He also said that corruption is rampant in the pollution control board officials and SMEs benefit by that. They choose to pay a few thousand rupees to the inspector instead of investing few lacs on environment friendly equipment.

Another concern which Mr. Deval voiced is that inspectors and officers of regulatory bodies do not fully understand the rules, which are very complicated for SMEs.

Atul Electro Formers Ltd. Is an SME manufacturing filter screens used in the manufacture of sugar. Their customers are mainly cooperative sugar companies and a few government companies. Almost all their customers are low technology, low managerial skills and located deep in rural areas with very little exposure to modern industry. The meeting was with Mr. Nitin Kibe, Managing Director of the company. He said that customers tell us bluntly:

“Environment controls are your problem, we have nothing to do with them, don’t charge us extra for that!”

Inspite of this Atul Electro Formers has been proactively managing their environmental impacts and doing more than compliance. This is because they use Nickel and several other toxic chemicals in their electro-plating process and generate hazardous waste. Due to this, they have had a long exposure to the state Pollution Control Board (PCB) and their officers. Mr. Kibe voices the same concern as Mr. Bhate of IAEP.

“The PCB officials have very low awareness of the rules and regulations, and even weaker awareness of what causes environmental degradation. They need to get some training for this purpose!”

He corroborated this statement by showing the standards for his industry in Japan. Most of the values were higher (more tolerant) than Indian norms. This is most surprising because with these standards, Japan would logically have more toxic dumped in their environment. Contrary to expectations, while Indian norms are more stringent, there being low or no enforcement, the environment suffers far more than Japan. This must surely be attributed to low awareness levels with officers of PCBs and their motivations to enforce them. Mr. Kibe said that his industry (electroplating) had a very high cost of environmental compliance – nearly 1% was his guess. Due to this reason, it is easy for unscrupulous businessmen to pay off PCB officials and reduce their costs. The PCB officials, he feels are given great powers (even to lock a defaulting company) and can use the ambiguity present in the regulations to their advantage. Thus he felt, small businessmen want to keep out these officers even if that means paying them off. The electroplating industry, as per Mr. Kibe, has the potential to damage the environment in a huge way, if it is controlled by PCBs then the environment is the sufferer. Alternately, he feels if customers drive environmental performance, things would improve. Companies would generally comply with customer requirements. Mr. Kibe has very close monitoring of process water and energy. They maintain an excel sheet which is department wise.

Keetronics is a manufacturer of membrane keyboard switches required in industrial applications. Their keyboards are used in machines, process control equipment, healthcare and other industries. Most of their customers are large Indian or multi-national clients (MNC). Mr. Rajesh Kulkarni, the M.D. and founder was interviewed in detail. Keyboard manufacturing process is highly labour intensive and uses lot of solvent inks, cleaners and soldering, processes which create emissions. This industry only has SME players in it, uses low technology and creates plastic waste. To cut costs, many of Keetronics competitors do not meet environmental regulations. Not being in the main polluter industries like chemical industry, they are not on the scanner of Pollution Control Boards (PCB). It is expensive to use solvent less inks, one of the key elements which

creates emissions. In fact, Mr, Kulkarni feels, there is no incentive for this industry to meet regulatory norms, and PCB officials do not even drop by for a surprise check.

In light of this, Keetronics has, over the last two years, improved their environmental dramatically. They are now preparing for an ISO 14000 certification.

4.4 The Conceptual framework and Hypotheses

After a critical analysis of previous research, and from the insights gained during the exploratory research, a conceptual framework was developed. The framework helps the research in suggesting relationships between factors and in identifying the variables in the process. It offers to explain either graphically or in narrative form the (i) main points to be studied, the key factors (ii) concepts or variables and the presumed relationships between them (Miles & Huberman, 1994). It is thus a tentative theory of what the researcher thinks is happening and why? Jabareen (2009) suggests that conceptual frameworks possess ontological, epistemological, and methodological assumptions, and each concept within a conceptual framework plays an ontological or epistemological role. The ontological assumptions relate to knowledge of the “way things are”, “the nature of reality”, “real” existence, and “real” action (Guba & Lincoln, 1994). The epistemological assumptions relate to “how things really are” and “how things really work” in an assumed reality. The methodological assumptions relate to the process of building the conceptual framework and assessing what it can tell us about the “real” world. The conceptual framework is constructed by the researcher not found from previous literature. It incorporates pieces that are borrowed from prior research, but the structure and overall coherence is formed by the researcher. They thus facilitate the research in the following manner –

- (i) Providing a means of setting out an explanation set that might be used to define and make sense of the data that flow from the research question.
- (ii) A filtering tool for selecting appropriate research questions and related data collection methods.
- (iii) A reference point or structure for the discussion of the literature, methodology and results.
- (iv) Most importantly, they set out the boundaries of the work.

They are not free from limitations, and two of the problems which could come up are:

- (i) Can be influenced by the experience and knowledge of the researcher. This is termed as the initial bias of the research.
- (ii)** Once developed can influence the researcher's thinking and may result in some things being given prominence and others being ignored. This is termed as the ongoing bias of research.

4.5 The conceptual framework proposed for this research

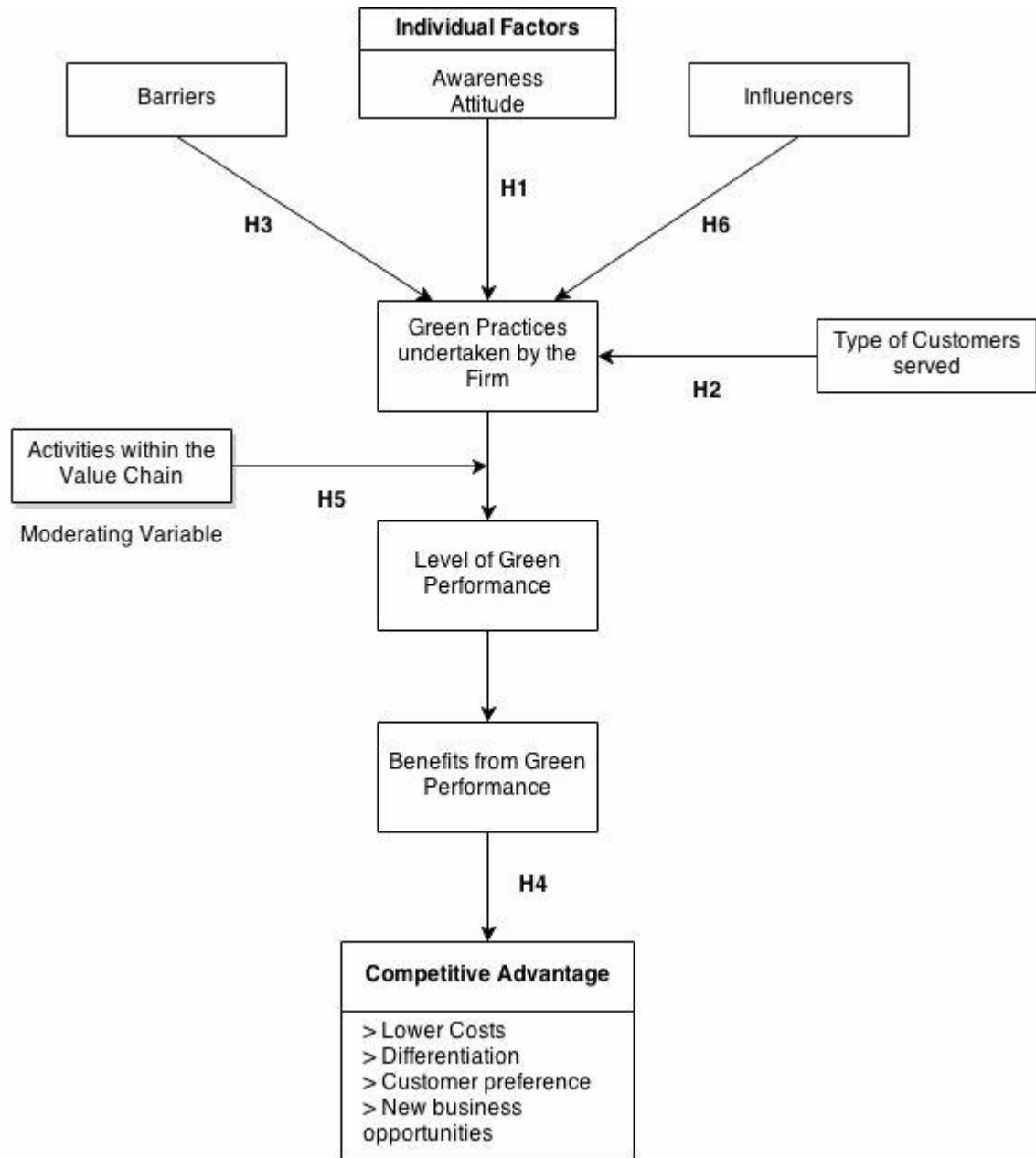


Figure 9: The Proposed Conceptual Framework and Hypotheses linkages

The central problem of this research is to identify whether improvement in environmental performance can be a source of competitive advantage for SMEs.

The conceptual framework developed for the research, thus accounts for the aspects which are likely to have an effect on environmental performance and competitive advantage as an outcome. The constructs of this framework are explained below:

- a. Factors related to the SME owner – his/ her awareness about the environmental issues and his/her attitudes towards them. This was based on prior research (Anglada, 2000) and considered important, since SMEs have a strong owner control. This factor is founded on the resource based view of the company which argues that the company's competitive strategies and performance depend significantly upon organizational resources and capabilities. This is applied to the owner of the company, since his/her capabilities are considered important driver for the organizational capabilities.
- b. Factors which can influence positive behavior in the SME owners. Research from other countries suggests that there could be several influencers towards green behavior. It was felt important to identify the influencers to Indian SMEs, since they could be strengthened to facilitate improved behavior.
- c. Factors which may act as barriers to environmental performance improvement. This would hold back companies in improving green performance. There are several barriers suggested by previous research from other countries. These factors would act as barriers and hence have to be identified.
- d. Type of customers which the company serves. This is considered a factor which would affect the green practices of the company. This is based on the exploratory research which shows that clients can drive SME vendors. Some respondents said that their customers included environmental performance as a criterion for vendor evaluation. These customers can impose green constraints on their vendors, typically SMEs, which is the reason why this factor is placed in the framework.
- e. These four factors act upon the SME. The resultant force would decide the green practices which the company undertakes. Since every company will have differing forces, depending on internal and external characteristics, the effect of these would vary for each company.
- f. The outcome of green practices determines the Level of Green Performance for that company. This Level is of a comparative nature and can help rank SMEs.

- g. Moderating variable - green practices within the stages of the product life cycle. This is proposed as the moderating variable since it can alter the impact on the Level of Green Performance. For example, companies which undertake green practices in manufacturing only, may have a lesser level of green performance than the company which has green design practices or green sourcing practices.
- h. The benefits that result from the green performance of the company. These are financial and non-financial. Varying levels of green performance will manifest into varying benefits.
- i. Competitive advantage that the green benefits offer.

As is seen from the diagram, competitive advantage is proposed to be the outcome of a series of factors and their linkages.

4.6 The construct of Competitive Advantage in the conceptual framework

As detailed out in the literature review section, competitive advantage has had several definitions in strategy. It is important to define it now, in the perspective of the central theme of this research – green business strategies. Campbell-Hunt (2000) in the meta-analysis on competitive strategy breaks down strategy literature into 4 approaches to competitive advantage (table 5)

Table 5: Meta-analysis of competitive strategy literature. Outcomes.

Archetypes	Totals
Cost emphasis	34
Differentiation emphasis	26
Mixed emphasis	9
No emphasis	11
	80

Hart (1995) suggests that innovative environmental strategies can lead to the development of company-specific capabilities which can be sources of competitive advantage. Barney (2002) proposes that “a company experiences competitive advantages

when its actions in an industry or market create economic value and when few competing companies are engaging in similar actions.” Real competitive advantage implies that companies are able to satisfy customer needs more effectively than their competitors. Based on the above findings and definitions, this research identifies presence of a competitive advantage with the help of the following indicators:

- a. The company lowers its costs. These are cost savings arising out of green practices – reduction of material, energy and waste, reuse, use of recycled content.
- b. The company or its product offers a differentiated value to customers. The differentiated value arising out of the company’s green activities – green design, green sourcing, green manufacturing, lower consumables, higher life, better recyclability, lower emissions etc.
- c. The company enjoys a position of advantage with a segment of customers, existing or new. The position of advantage arising out of the customer’s preference for greener vendors.
- d. New business opportunities are opened up for the company as a result of its green performance. These would be opportunities which open based on the green performance.

For the purpose of this research, a company will have gained a competitive advantage when it demonstrates at least three of the above four indicators.

4.7 Hypotheses

Based on the review of previous literature and the exploratory studies conducted with SMEs and large companies, the seven hypotheses are proposed for this research. These hypothesis act on the constructs of the conceptual framework and are depicted on the figure.

H1 - *An SME’s environmental performance is dependent on the awareness of the owner towards the industry environment relation.*

H2 - *SMEs serving large customers have a better environmental performance than those serving small customers.*

H3 – *Multiple internal barriers hold SMEs back from improving the company's green performance.*

H4 – *A high level of environmental performance can gain the company an advantage with its customers.*

H5 – *The extent of coverage of green practices within the product life cycle is positively correlated to the green benefits.*

H6 – *Various stakeholders have a role in creating facilitative atmosphere for SMEs to improve environmental performance.*

H7 – *SMEs perceive green practices as an added cost negatively affecting competitiveness.*

4.8 Questionnaire and Sampling Plan

There are various methods of data collection available for the researcher. The choice depends on the objectives of the research and the resources under control. In the previous stage interview technique of data collection was employed. This is not suitable when the sample size is large and when the questions are structured and repeating. For the data collection in this research, the technique of using questionnaires to collect data is considered the most suitable. A good questionnaire collects data which can help support or disprove the hypothesis. While this is a time tested method, it does have certain limitations. These limitations can, to a certain extent, be overcome by employing sound principles of questionnaire design and data collection. These principles are summarized in the sequence below:

Plan what to measure – this is based on the conceptual framework prepared in the earlier stage. The sections of the questionnaire were based on the frameworks.

Format the questionnaire – this helps the respondent feel the logic in the sections, while leading him from the surface to the depth of the issues.

Choice of wording – since the respondents are heterogeneous, having different educational backgrounds, knowledge and awareness and most importantly differing priorities of environmental performance for their companies, the choice of words is very important. The words should not be ambiguous and simple to understand, they should not

lead the respondent to a choice. Clear questions are more likely to result in factual responses, while unclear questions may confuse the respondent into giving improbable responses.

Sequence and layout – the sequence of questions should follow sub-topics, aiding the respondents thought process.

Pretesting – every questionnaire must be pretested. This is also termed as a pilot survey. More often than not, pilot surveys show up questionnaire faults not seen by the researcher. The questionnaire was pretested with 5 respondents, which helped improve the sequence and the choice of words in some questions.

The final questionnaire is attached in Annexure. It consists of 6 sections, as follows:

a. Demographics of the company.

This section consists of 9 questions which collected the demographic data of the company. The question about sales turnover was not made mandatory, since the literature review did not show any relation between that and the company's green practices. The type of industry that the company is in considered important based on prior research. The responses were classified into: Engineering (mechanical or automotive), Electrical and Electronics, Plastics and packaging, Chemical and Others. Another question of importance was concerning the customers of the respondent. They were asked to rank the customers based on approximate business, from the list. One of the hypothesis is that customers can influence green behavior in SMEs and hence this question was asked. This was supported by Q34 and Q35.

Analyses of the responses.

Grouping of responses was possible with the industry classification and the type of customers. During the statistical analysis, both these groupings were utilized.

b. To identify the critical issues facing SMEs.

This section has 2 questions. This section tries to find out what kind of business activities would the owners time be occupied with. This is considered important since if the owner has time to spare, will he/she consider engaging in activities which may be a cost today. Seven common issues of small enterprises are shown and the

respondent is asked to make a choice on a three point Likert scale. Two options are given beyond the Likert scale – Does not exist and Not aware.

- c. To assess awareness of towards the environment.

Five questions in this section try to understand the respondent's awareness about the connection between the environment and industries.

Analyses of the responses.

The responses are marked and a level of awareness rank is given to the respondent. Three Levels of Awareness are assigned based on the scores. High, medium and low. These were useful in the statistical analysis where the respondents were grouped in the three levels.

- d. To assess the attitude towards environmental regulation and performance. People hold attitudes toward particular things, or objects. It has been suggested by psychologists that a person's attitudinal feelings are directly driven by his/her beliefs or cognitions, which is dependent on the person's knowledge. The concept of an "attitude" comes from social psychology, defined as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1996). In social behavior, attitude is as a disposition to respond consistently to specific aspects of the world, including actions, people, or objects. There is significant literature on attitudes. Approaches to measuring attitudes vary from simple ones using ranking and rating questions, to complex approaches that distinguish attitudes, perceptions, values, and beliefs. In this study, the commonly used approach in social surveys of measuring attitudes with ranking and rating questions was employed. The questions included their awareness and understanding of environmental practices and attitudes towards environmental practices by industries. This was asked through 11 questions starting with generic industrial ones to respondent specific industry ones.

Analyses of the responses.

The responses in this section were given scores and from the total spread of scores, three groups could be made. The groups were termed Positive attitude, Indifferent

attitude and Negative attitude. These groups were useful in the statistical data analysis.

- e. To understand the level of green performance of the company.

This section of the questionnaire tries to establish a “Green Performance Level” for the respondent company. This is therefore the most detailed section consisting of 10 sets of questions. The questions seek out the green practices currently undertaken in the company and were built to delve into the “Green practices within the product life cycle” in the conceptual framework. A generic product life cycle of SMEs within the study group is shown in the figure below.

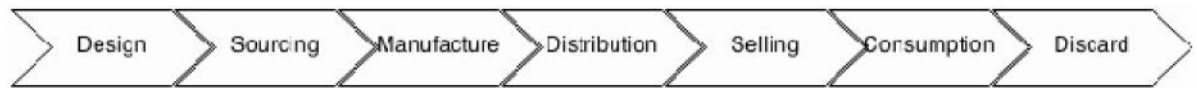


Figure 10: Generic Product life cycle of a firm

For every stage of the product life cycle, questions were asked along with relevant options.

Analyses of the responses.

In this section too, marks were given to the responses. Every stage in the product life cycle was given marks and from these a total Green Score was given to the company. (Table 6)

Table 6: Scheme of Scores allotted to Green Practices

Score Name		Questions
<i>Strategic Approach Score</i>		Is environment considered in Vision-Mission statements, environmental targets, in-house communication, employee participation, environmental consultant? (q21)
<i>Process Score</i>	<i>Waste</i>	Generation and treatment of fumes, effluent and process waste (q22)
<i>Green Tools Score</i>		This set of questions find out the use of tools like Lean, Six Sigma, WCM, EMS, life cycle assessment, CII GreenCo rating, Carbon

	footprint and Ecological footprint.
<i>Monitoring Score</i>	How well does the company monitor its energy, water and waste and at what level – aggregate, department, machine?
<i>Product Design Score</i>	Designing products for – lower material, energy, consumables, longer life, clean tech, more recycled content, more recyclability, easy discarding.
<i>Sourcing Score</i>	Are the SMEs vendors qualified on QMS and EMS?
<i>Impacts Score</i>	What impacts of green practices were observed in last one year – lower energy, material, waste, effluent, fumes, more recycled content, stopped products with toxic waste
<i>Recognition Score</i>	Awards or recognitions received related to environment, society, quality were noted
<i>Communications Score</i>	This enquires if the green approach is communicated to customers
<i>Total Green Score</i>	Sum of all above scores
<i>Company's Level of Green Performance (LGP)</i>	Less than 17 marks = Low level L3 Between 17 and 29 = Mid Level L2; Above 30 marks = High Level L1

From the spread of all the green scores of all respondents, three levels could be established. These were termed as the “Green Performance Level” of the company. The respondents were categorized into the three levels termed as High, Mid and Low level performances. This grouping too proved invaluable for the statistical analysis. Hypotheses were tested on these three groups. Significant differences were observed within the three levels, especially about benefits gained from green practices.

- f. To establish the role of stakeholders in adoption of green practices. The last section had 2 sets of questions and was aimed at establishing the positive influencers to green practices. The questions requested responses from internal and external influencers.

The questionnaire employed various types of questions like open ended, yes/no, ranking and rating scales. The rating questions used the Likert three point scale and five point

scales, as was relevant to the questions. The final questionnaire was screened for the following problems:

- (i) Ambiguous words and terminology not commonly used within SME circles, was removed.
- (ii) Questions were checked to see if they were leading to any choice.
- (iii) No questions sought any confidential information or business secrets. The question on the sales turnover of the company was kept optional, considering many small companies may not like to reveal this.
- (iv) The flow was logical and followed the stages of the product life cycle.

4.9 Pilot testing of the questionnaire

Testing the questionnaire on a small sample, called as pilot sample, is recommended in research. This helps the researcher in two ways (i) Tests the clarity of the questionnaire and the ambiguity in questions. (ii) Can help bring out logical flaws or structural inconsistencies in the questionnaire. After this, the questionnaire can be further improved before deploying the study on the intended sample.

As part of the pilot testing, the questionnaire developed, was tested with 3 SMEs. The companies were Filteron India Pvt. Ltd., Insta Control Pvt.Ltd. and Keetronics (India) Pvt.Ltd. Post the pilot, the final tweaks were done to the questionnaire.

4.10 Deploying the questionnaire

Several options were evaluated for the questionnaire. They are summarized with their pros and cons as below.

- (i) Paper and pen – this is the traditional way of recording the responses of questionnaires. Printed questionnaires are filled out either by the respondent himself or by a trained person. Pros – this can give the researcher more information than requested. Questions can lead to a conversation giving more insights to the research. Cons – time consuming and expensive. The researcher has to travel and spend time waiting and in the interviews. For samples spread across a large geographical area like Pune industrial region,

this factor was not considered suitable. Nevertheless, the researcher himself collected 12 responses, which resulted in substantial insights.

- (ii) Telephonic interview – this was popular some time back, mainly because of its potential for time and cost saving. The major limitation of this technique is that respondents are averse to answer questions about their business to an unseen face. This technique was ruled out for use in the present research, due to this one limitation. However, some respondents were called up after receiving their responses, to either cross check (when not done by researcher himself) or in case of problems in the responses.
- (iii) Online questionnaire – this is of a more recent origin and brought about by the advent and diffusion of the internet in society. Several online services are available which can be used to design questionnaires, collect data and also analyze it. Some are free websites while the professional ones are paid. Pros- this helps collect the data directly in a format suitable for Statistical packages (like SPSS or MiniTab). Cons – can get impersonal, lacks the value of an aid in responding.

For this particular research, this format was considered the best choice and was employed. The services of Surveymonkey.com were purchased for a 6 month period.

The designed questionnaire was entered in the online format in Surveymonkey. Emails were sent out to some samples and they were helped to fill this up with telephonic support where required. Surveymonkey.com also allows printouts of the questionnaire, and some questionnaires were printed and filled up by the researcher himself, sitting with the respondents. The manually collected data was filled up online and the manual copies were retained too.

Surveymonkey makes the data available in 2 formats – Microsoft Excel and .csv. Both the formats were useful in the data analysis stage, since Microsoft Excel and SPSS was

used in the analysis. All the data were also stored online on the SurveyMonkey servers.

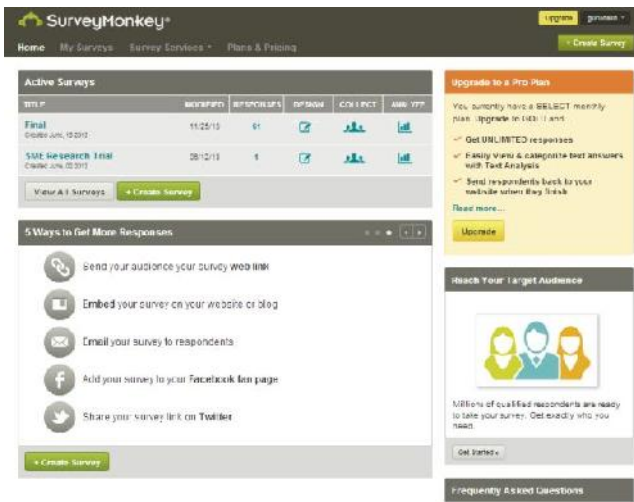


Figure 11: Surveymonkey website

For the purposes of data security, the data were saved on three separate drives – the data were automatically saved on the SurveyMonkey servers, they were downloaded and saved on the researchers laptop and a backup was made every week on an external hard-disk.

4.11 Sampling methodology

Since it is impossible for this research to reach out to every SME within the Pune region, sampling is the only resort. To draw conclusions about populations from samples, inferential statistics is employed, which helps determine the population's characteristics by directly observing only a portion (or sample) of the population. We obtain a sample rather than a complete enumeration (a census) of the population for many reasons. Sampling is an important component of any research because of the significant impact that it can have on the quality of findings. The sample size and choice are both important constituents of the methodology. Too small a sample and the findings may not be statistically sufficient to estimate the population's characteristics. Too large a sample can be expensive in terms of time and money, while yielding lower incremental insights. An optimum sample is thus one which is sought after by every researcher. An optimum sample size is defined, by most researchers as one which represents the population properly. The example given is that of blood sampling, where just a microgram of blood

is a sufficient sample, since it so well mixed and represents the entire population of blood in the body.

Similarly, the choice of sample too has a significant impact on the research findings. A convenient sample may not be representative or worse, may be skewed in some characteristic based on the ‘convenience’. Researcher’s bias may creep into a non-random sampling plan. Thus it is imperative that for drawing a representative sample, the sampling frame must be a well represented one covering a large portion of the population. Three sampling frames were chosen for this study

- (i) Maharashtra Chamber of Commerce (MCCIA) list of member SMEs in Pune. MCCIA is the local chamber of commerce for Pune industrial region, and is a widely recognized and respected body. They have an SME membership, wherein SMEs are benefitted by training programs, industry representations and similar other facilitative functions. It is estimated that over 65% of industrial SMEs in Pune region are members of MCCIA. The member list for 2009 was taken from MCCIA in the Microsoft Excel format. The list consisted of 2501 members, across all sectors and in b2b and b2c businesses. To meet the criteria set out for inclusion of samples (Next section), the data were filtered for identifying SMEs in Pune, in b2b markets and by availability contact details. Members from the following industries were filtered out –

Table 7: Industries included and excluded in the sampling plan

Industries included in the sampling frame	Industries excluded in the sampling frame
All automobile and auto ancillary companies – including plastics, metal, electronic & electrical, rubber, fabrication, chemical etc.	All building & construction related companies
All chemical industries	All education related companies and trusts
All electronics and electrical industries	All food related companies
All machinery and machine tool industries – including machine tool manufacturers, jig and fixtures, tool and die makers	Glass, Leather, Perfume, Software, Paper and printing, Textile, Wood and furniture
All metallic products and fabrication – excluding construction and home repair	Architects, Advocates, CAs, CS, All consultants, Brokers

All plastics and packaging	Cold storages
	Hospitals, healthcare and medical facilities
	Software and ITES
	Insurance services, Immigration services, transport service, Pest control services
	All NGOs

This left a database of 1009 members who fulfilled the criteria for inclusion of the sample (next section). Emails were sent out with the link to over 500 companies chosen at random from the 1009.

- (i) The second sampling frame was a the vendor list of six large industries in Pune. This was a list of their SME vendors with contact names and products supplied.
- (ii) List of SMEs known to the researcher. This consisted of about 20 SMEs, of which the researcher had some knowledge of – either a known contact or some business connection.

There are two broad categories of sampling techniques –probability and non-probability techniques of sampling. For this research, a non-probability sampling was used. This utilizes certain subjective judgment of the researcher, but based on a set of criteria for inclusion and exclusion of samples. If the criteria for inclusion and exclusion are based on sound reasoning, then the subjective judgment of the researcher is minimized which in turn is likely to reduce the bias in sampling. The criteria are discussed in the next section.

4.12 Criteria for sample inclusion/exclusion

As mentioned earlier, a set of criteria were used to filter out the SME sampling frame. A valid research must make a prediction about the population, with a high probability. Usually a 95% confidence is expected. For this, the sample chosen must be representative of the population about which the estimation or prediction is being made. To increase the probability of the research predictions, the sample is defined as narrowly as possible making the findings relevant to the population which it represents. Thus, this research

does not claim to make predictions or estimations on all b2b SMEs in Pune, but to only those that the sample criteria fulfill.

The criteria and the reasons for choosing them are discussed below.

- (i) The sample must have its primary manufacturing in Pune industrial region. The Pune industrial region is defined for this study as the PCMC area, PMC areas and the industrial areas adjoining PMC and PCMC. The reason for this criterion is obvious – the local pollution control board authority extends to this region and this would influence regulatory green practices within these SMEs. As an example, it is estimated that SMEs in Nasik region have less rigorous pollution control enforcements, making them less ‘green’ compared to Pune industries.

The second reason for this inclusion criterion is that SMEs supplying to a similar set of customers in Pune region will be in a more homogenous competitive atmosphere. Pune has traditionally been the educational centre for India, and has the presence of several good technical institutions. This has spawned hundreds of businesses, some of which are now large multinational companies. Moreover, the proximity to Mumbai and good engineering talent has helped establish Pune as a strategic choice manufacturing base for many MNCs. The Tata Motors truck plant came up here as early as 1967, followed by Bajaj Auto and several Swedish companies like Alfa Laval, Atlas Copco and Sandvik Asia. This activity further gave boost to the small entrepreneurs and small industries, which were essential as a vendor base for the large companies.

- (ii) The SME must be in industrial markets (b2b) and should be either manufacturing products or provider of manufacturing services. This eliminates traders, channel sellers, restaurants, hotels, builders and construction houses and all other b2c businesses. The reason for this criterion is that b2b markets are more demanding in fulfilling regulatory requirements, while consumer markets may be oblivious to them. Take the example of the restaurants – very few customers may know the regulatory requirements of garbage disposal, child labour use etc, due to which, restaurants which blatantly violate the norms are not less successful than those

who comply. On the other hand, quality and regulatory compliance is expected within industrial SMEs. Many large companies have an elaborate vendor approval process, which audits quality and regulatory compliance. This makes for a level playing field for b2b SMEs.

This research seeks out those companies which go beyond customer and legal expectations, to understand their motivations for doing so and the benefits in the process. Thus this criteria is of importance for industry. This also means that the findings of this research will not be relevant or useful for b2c businesses.

- (iii) The SME must be in business for over 3 years. This excludes start-ups, which is important, because start-ups may have different type and scale of problems, which may prevent them from thinking green. On the other hand, companies which are over three years old, are likely to have regular business and revenue streams, which offers the owner the opportunity to do other things like greening the business.

Startups face issues like arranging finance, hiring the right team, seeking out business and building competitive products. While these set of issues are present even with companies more than 3 years old, nevertheless, older companies are likely to have them under some control.

4.13 Details of the Sample respondents

In accordance to the sampling methodology outlined in the earlier section, the questionnaire was sent out to over 500 companies through an email link, from which about 65 responses were received. Invalid responses (not meeting selection criteria) and responses with more than 33% questions (10 questions) unanswered, were removed. This left 37 valid responses.

34 SME owners were met in person and responses were filled out, either by the researcher himself or by his designated person. From these 34, 11 were invalid and were discarded. The remaining 23 responses were valid and entered manually into the SurveyMonkey database. The final valid number of responses received was 60. These 60

SMEs met the criteria of sample selection. The discussions and statistical analysis which follows in this dissertation is for these 60 SME respondents.

4.14 Estimation of the population of SMEs in Pune region

Various sources of data were analyzed to arrive at an estimate of the population of SMEs in Pune, which fulfill the criteria of this research. Some of the sources studied are listed below:

- a. MCCIA members list
- b. Economic Survey of Maharashtra 2012-13. Published by the Directorate of Economics and Statistics, Planning department, Government of Maharashtra (2013).
- c. Dun & Bradstreet – Saffron Capital Advisors SME Cluster Series 2010: Pune. (D&B, 2010) <http://www.dnb.co.in/smepune2010/default.asp>
- d. MIDC official website statistics. www.midcindia.org

By studying the data available in the above, the researcher estimates that there is a population of about 5000 SMEs in Pune, who would fulfill the criteria for this research.

Logic 1 for estimation:

SME units in MIDCs in Pune (as per MIDC report)	7593
SME units in Pune, outside MIDC (estimated equal to MIDC)	7500
Total SME units in Pune	15000
Of which are b2b and manufacturing (estimated 50%)	8000
Of which are in industries specified in above list (estimated 60%)	4800

Logic 2 for estimation

SME units in MIDCs in Pune member of MCCIA (meeting sampling criteria)	1009
SME units in Pune, not a member of MCCIA (estimated 4 times)	4000
Total SME units in Pune	5000

Thus the researcher proposes a calculated estimate of about 5000 SMEs in Pune region which satisfy the sampling criteria. Considering this population, the total valid responses for this research are 60, which amount to 1.2% of the population.

Table 8: Data on operational MIDCs in Pune region on 31 March 2009

PUNE	MIDC industrial areas			Industrial Units		
Major	Mini	Growth Centers	Total	No.	Investment in Billion Rs	Employment
29	18	19	66	7593	180.93	311,005

While 1.2% may seem to be a small sample size, the 60 respondents were representative of the population in Pune. Getting 60 responses itself was a difficult task requiring several reminders and requests. SMEs generally are averse to sharing business data or information and for this reason, the exercise of data collection took nearly 5 months.

4.15 Data collection methods employed

As discussed earlier, the questionnaire was made using the online tool SurveyMonkey.com. This gave the option of collecting data in three different ways. All the three ways were used for this survey.

- (i) Manual paper and pen data recording – for this a printout and photocopies of the questionnaire were made. The data recorded on paper can then be entered manually online. This method was employed where the researcher went to meet the contact himself or sent his trained person.
- (ii) Emailing the online link to a respondent – in this method, the respondent needs to click the link and choose the responses online. The responses are automatically recorded, along with the IP address of his computer, date and time of the response.
- (iii) Online filling of a questionnaire by the researcher – this method was suitable for those who did not have access to internet or those who did not wish to fill up online. Here, the researcher opened the link himself on his laptop and recorded the responses of the respondent online on his behalf.

4.16 Issues in data collection

SMEs with their limited resources and high dependence on their customers are usually wary of competitive activity. This can be likened to the survival instinct of a small animal. Perhaps for this reason, data collection for researchers from SMEs is most challenging. In the present research too, the researcher faced a low response. This is understandable for email requests sent to companies who do not know the researcher, but this happened with companies where the researcher had some contact too. There were ones who simply denied responding, and others who avoided reminder calls. This is despite the fact that none of the data is competitively confidential.

The other major issue was in email responses. This was some answers were left incomplete in the email link. To overcome this problem, the researcher called the respondent and asked if he could answer the incomplete questions over phone. Many agreed and their responses could then be completed. Some did not and those were left as it was. This was mostly of the nature of data Missing at Random (MAR).

The data Not Missing at Random (NMAR) was the question enquiring the sales turnover. This was kept optional, since many small companies do not wish to disclose this.

The final list of valid responses and how the data was collected is shown below:

Table 9: Names of SMEs who gave valid responses

	Name of the SME	How data was collected	Date of Response
1	A S industries	Responded online	11-Sep-13
2	A Square Technosolutions	Responded online	24-Nov-13
3	Aagami Lighting Technologies	Responded online	2-Aug-13
4	Abicor Binzel Production (Indi	Responded online	5-Aug-13
5	Adept Fluidyne (P) Ltd.	Responded online	5-Aug-13
6	Ajit Enterprises	Responded online	24-Nov-13
7	Amasht Paper Hygiene Products	Responded online	27-Jul-13
8	Anil Plastics and Enterprises	Responded online	11-Sep-13
9	Animesh Packaging Industries	Responded online	8-Aug-13

10	Ankur packaging	Responded online	23-Nov-13
11	AnupPolychem Industries	Responded online	10-Sep-13
12	Arihant Polymoulds and Polymer	Collected in person	19-Aug-13
13	ATE Welding Engg Robotics P.Ltd.	Responded online	12-Jul-13
14	Atul Electro Formers Ltd.	Collected in person	25-Jun-13
15	Bhushan Engineers	Responded online	24-Nov-13
16	Chem-e-leck	Collected in person	9-Aug-13
17	Deval Electroplaters	Collected in person	24-Jun-13
18	Deval Untesils Factory	Collected in person	24-Jun-13
19	Dinesh Industries	Collected in person	19-Aug-13
20	Filteron India pvt.ltd.	Collected in person	25-Jun-13
21	FineArc Systems	Responded online	24-Nov-13
22	Gear Control	Responded online	13-Jul-13
23	Genie Auto Products Pvt. Ltd.	Responded online	25-Nov-13
24	Healthmark Pharma	Responded online	14-Sep-13
25	Hegde Precision Engg Works	Collected in person	19-Aug-13
26	Hydrolinks	Responded online	25-Jul-13
27	Industrial Electronic & Allied	Collected in person	24-Jun-13
28	Ingenesys Engineering & Consulting	Collected in person	27-Aug-13
29	Intel us Electronics Pvt.Ltd.	Collected in person	8-Jul-13
30	Kalpna glass fibre pvt ltd	Responded online	19-Oct-13
31	Keetronics (India) Pvt.Ltd.	Collected in person	24-Jun-13
32	Kirloskar Integrated Technologies	Responded online	24-Jul-13
33	Lensel Optics Pvt. Ltd.	Collected in person	19-Aug-13
34	Lotus Tapes (I) Pvt.Ltd.	Collected in person	10-Aug-13
35	Mutual Industries Ltd	Responded online	13-Jul-13
36	Nand Composites Pvt.Ltd.	Collected in person	7-Jul-13
37	Nikhil Equipments P.Ltd.	Responded online	12-Sep-13
38	Om Engineers	Responded online	17-Sep-13
39	Phoenix polymer industries	Responded online	6-Aug-13
40	R S Enterprises	Responded online	23-Nov-13

41	Rapid Machining Tech Pvt.Ltd.	Responded online	31-Jul-13
42	Rishi Engineering Company Pvt	Responded online	25-Jul-13
43	Ronch Polymers Pvt. Ltd.	Responded online	12-Sep-13
44	Sakar Udyog	Collected in person	7-Jul-13
45	Samarth Industries	Responded online	23-Jul-13
46	Sanlan Controls	Collected in person	4-Jul-13
47	ShreeRenukar Indl Corp	Responded online	4-Aug-13
48	Shri Sai Siddhi Industries	Responded online	23-Nov-13
49	Shriranga Industries	Collected in person	7-Jul-13
50	Siddha Laxmi Engineering Pvt L	Collected in person	24-Jun-13
51	Sinewave Engg Pvt.Ltd.	Responded online	25-Jul-13
52	Solar Biotronic Laboratories	Collected in person	5-Jul-13
53	Stokvis Prostick Tapes Pvt. Ltd.	Collected in person	27-Aug-13
54	Transcoil	Collected in person	4-Jul-13
55	United Industries	Collected in person	7-Jul-13
56	v m engg co .pvt ltd	Collected in person	26-Jul-13
57	Versa Controls	Responded online	8-Aug-13
58	Visionmax Industries Pvt. Ltd	Responded online	24-Nov-13
59	Water wings Equipment Pvt.Ltd.	Collected in person	11-Jul-13
60	X Trans Enterprises	Responded online	28-Jul-13

4.17 Testing of internal Reliability of summated questions

Reliability refers to the consistency and stability of the findings, which enable them to be replicated. The issue of reliability is important since summated scales like Likert are used as predictors in the research. It is thus imperative that the same set of items would get the same responses if the questions were put again to the same respondents. The popular reliability measure of Cronbach's alpha was employed in this questionnaire to determine the internal consistency of items in the questionnaire. With this, the internal reliability of five questions each of which contained several items, was tested using the Cronbach's alpha coefficient of correlation, by SPSS.

Table 10: Reliability testing on summated questions

Question set	Number of items	Cronbach's α	Remark
Q11 Critical issues for the company	7	0.585	Acceptable
Q18 Attitudes towards environmental practices	6	0.624	Acceptable
Q19 Barriers towards Green practices	8	0.827	Acceptable
Q31 Influencers for Green practices	10	0.823	Acceptable
Q32 Attitudes towards diffusion of Green practices	8	0.790	Acceptable

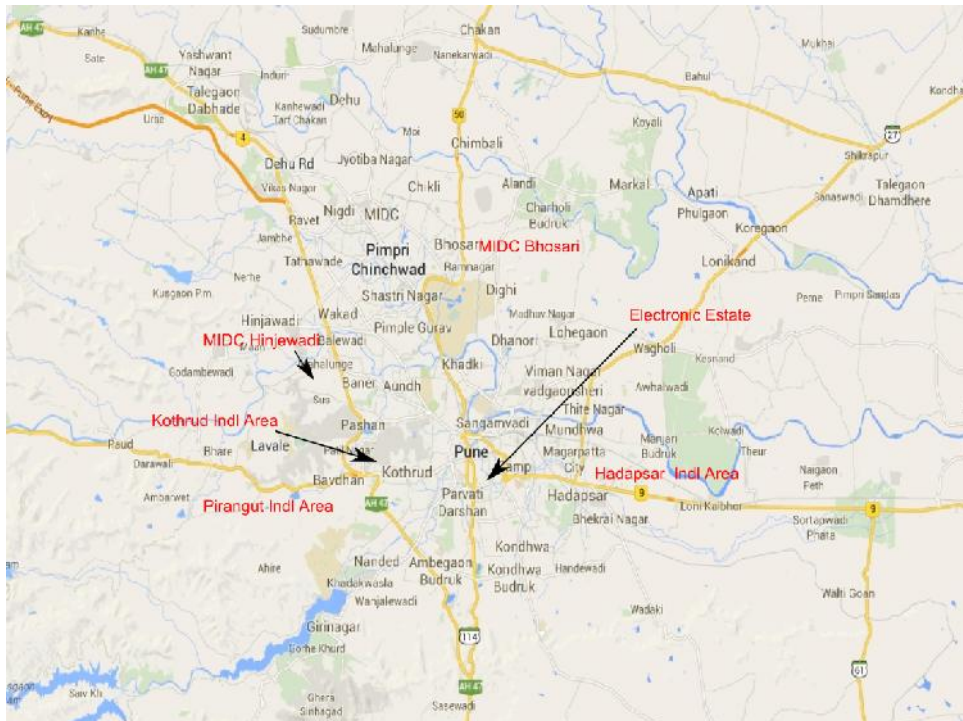
4.18 Limitations of this research

No research is without some limitation, but it is important that the researcher identifies the limitations. This research too had its share of limitations, which are listed and discussed below.

1. The inferences and conclusions drawn in this research are for the SME population of Pune. Pune has been a centre of education with many reputed technical institutes and research organizations, which has been instrumental in making it a strong cluster for engineering and technology companies. This is not the case with other SME clusters in India. For example Ahmednagar, Nasik, Belgaum, Rajkot and many other SME clusters do not have the reputation of advanced engineering and technology companies. International joint ventures or technology sharing arrangements are seen in many SMEs in Pune. Presence of large multinationals, who depend on SME vendors is higher than many other SME clusters. For these reason, the results of this research may differ if the study were conducted in other places.

To overcome this limitation, a similar study has to be undertaken in various other SME clusters in India.

2. Limitations of the sample size. The primary data was collected from a sample size of 60. All statistical analysis was conducted on this dataset. Although this is statistically a significant number, when grouping was made within the data, the data lacked power. The three groups of levels of green performance had only 12, 23 and 25 companies in high, mid and low categories. These are statistically small samples. This can be corrected by employing a larger sample size than the present.
3. Limitations of the sampling plan. Sampling was done from three sampling frames that were made available to the researcher. These do not fully represent all the SME population of Pune which are qualified for this research. Sampling was done by a non-random method and convenience sampling too was used. This reduces the samples ability to represent the characteristics of the population. To overcome this limitation, it is recommended that more sampling frames are included and the sample size be increased.
4. Limitations arising out of researcher's bias. Unknowing to the researcher, his past experience, his level of knowledge and the context, all these are considered to bring a bias in the research. For example, the researcher has spent 20 years in an SME in the automotive sector. This may have created some bias and perceptions towards this sector, which is likely to manifest in the research.



Chapter 5

Data Interpretation and Findings

Chapter 5 – Data Interpretation and Findings

5.1 General discussions and Descriptive Statistics

All the respondents had either manufacturing or manufacturing services as their principal activity and operated in industrial (b2b) markets. This was due to the criteria set for sample selection and the respondents thus matched them. B2b SMEs are generally technologically higher as compared to b2c SMEs. They operate in technically competitive markets and their customers are other large or small businesses. Prior research suggests that such SME companies are organized in terms of quality systems and businesses processes and are more likely to be aware of environmental regulations and general practices than b2c companies. This research thus narrows only on these companies while keeping b2c companies out of scope. A total of 60 valid questionnaire responses were analyzed in this research.

5.2 Industry sectors of respondents and its relevance

While SMEs operate in every industry, the researcher selected four industries. These were selected on the basis of their significant numbers present in the Pune region. The industries chosen for this study were Engineering (either mechanical or automotive) Electrical and electronics, Chemical, Plastics and

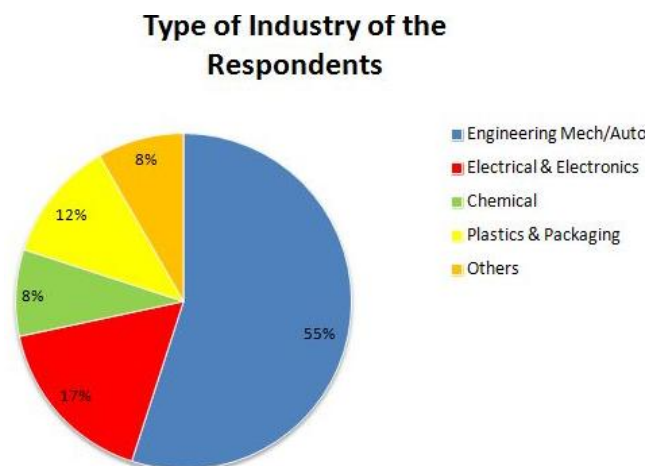


Figure 12: Industry break-up of the Respondents

Engineering	33
Elect & Electronics	10
Chemical	5
Plast & Pack	7
Others	5
TOTAL	60

packaging (v) Others.

This, to a fair extent, represents their presence in the Pune region, with mechanical and automotive companies being the most. Since the number of responses in each category was low (other than engineering companies) grouping based on industry type for statistical analysis, was not feasible. There were 3 firms in the manufacturing services business.

As mentioned in the introduction section, the environmental regulatory mechanism in India is led by the Ministry of Environment and Forest (MoEF). They frame policies under the various acts of parliament and the Central Pollution Control Board (CPCB) is the apex body entrusted with powers and functions under the Water and Air Acts. The CPCB supports their state counterparts – the State Pollution Control Boards (SPCB) in their activities and are responsible for monitoring and controlling industrial pollution at the state levels. The ministry has categorized industries on their potential to pollute, into Red, Orange and Green. Companies in the red list are under close observation by the SPCBs while those on the Green list are not. This translates into a differential attitude of the SPCB towards various industries. The electroplating industry, for example, has close vigilance of the SPCB on the other hand an mechanical engineering SME may have never known about the emission norms for his industry. This puts varying pressures of compliance which may have an effect on the company's green performance.

5.3 Type of customers that the respondents served and its relevance

Based on Hypothesis 2 of this research, one question enquired which type of customers

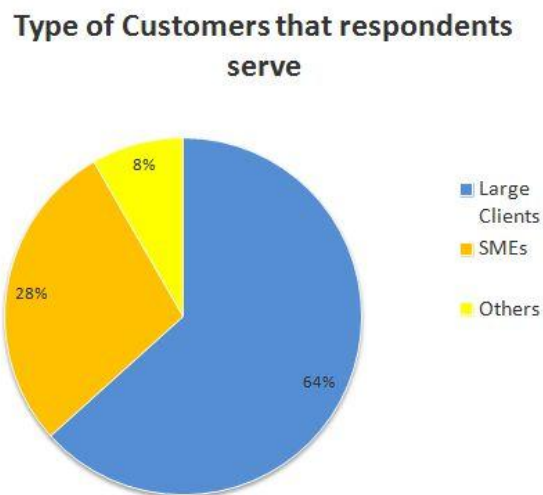


Figure 13: Respondents' customers – whether small or large firms

the SME served. This hypothesis proposes that companies serving large clients are likely to have a better environmental performance than those serving SMEs. The responses to this question were clubbed into two groups – one set of companies which primarily served large customers (either Indian or MNC customers) the other which served primarily SMEs, and those which served others (traders, government etc). The respondent break-up is shown in chart 2 (C2). These groupings provided for statistical analysis with which the hypothesis could be tested.

Large organizations have a growing awareness towards the environment and many companies have environmental management systems (EMS) in operation. In the 2012 study of sustainability in large companies it was seen that over 54% of US companies have sustainability goals and practices. Such customers need to incorporate sustainable practices within their supply chains, which comprise mainly of SMEs. They can pull SMEs into sustainability practices, to meet their own goals. This was clearly seen in the SME interviews. Mr. Rajesh Kulkarni of Keetronics said

“It is only because of GE that we have implemented environmental practices in our business. Had it not been for them, we would continue doing things the same way. In spite of meeting their quality norms and standards, they did not give us a vendor code only because we did not have any green practices. This challenged us and within one year, we improved our green performance. This has now become a norm in our organization and even our workers are involved in suggestions.”

Similar reactions were seen with other respondents too. One respondent who supplied to Tata Autocomp said

“Quality standards and environmental standards are integral part of our clients’ vendor audits. Thus we have to continuously monitor our environmental performance and measure waste.”

On the other hand, one SME owner Mr. Renavikar of Sanlan Controls, who make fluid control valves for refrigeration and air-conditioning, only have traders as their customers.

Mr. Renavikar had an awareness level of Low as well as a Low Green Performance Level (explained in the next sections. He said

“Our customers are not interested in any green technology. They are in a highly price competitive market and are not ready to pay more even for better packaging.”

5.4 Assessing the Awareness about the environment and industry

The awareness about environment and industry and environmental practices in industry was enquired by a set of 3 questions. The responses were given marks and the total score was termed as the Awareness Score. The scores ranged from 0 to 19 with a mean of 9.75 ± 4.132 . This was a large variation for further statistical analysis and three groups were made from the scores. The groups were termed as High Awareness, Medium Awareness and Low Awareness. The number of companies within each level is shown in the table below.

Table 11: Number of respondents at each Level of Awareness

Level of Awareness		Frequency Number of companies	Percent of companies
Valid	High Awareness	12	20.0
	Mid Awareness	31	51.7
	Low Awareness	17	28.3
	Total	60	100.0

**Respondents who attended a training /
conference or seminar on Environment in last
one year**

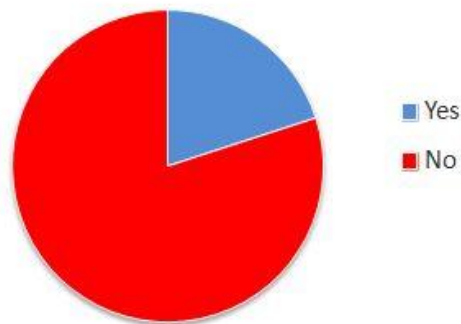


Figure 14: Number of respondents who attended Environmental training

Only about 20% of the respondents showed a high awareness towards the environment-industry relation. This suggests the need to urgently address the SME owners in terms of improving their awareness. In absence of or in face of low awareness a positive behavior is unlikely to result. The next question on training or conference on the environment was surprising too. Just 20% of the respondents had attended any training or conference in the subject of environment, in the last one year.

There is an ever increasing media attention on industry - environment linkages however, SMEs do not face the heat due to their small size and low profile. As discussed in the earlier section, many large companies have included some form or the other of environmental aspects in employee training. In the exploratory study, the researcher found that Godrej, Persistent and Cummins had environment as a topic in some employee training. Within the 60 SME respondents, only 12 had attended environmental training. To check if there is any dependence between the type of customers that the SME serves (Table) and training attended, a cross tabulation was conducted on these two questions.

Table 12: Cross-tab of Respondent by Cust-type and Attended env training

Respondent by Cust_Type	Attended any Environmental training	
	Yes	No
Companies serving mainly large customers	8	31
Companies serving mainly SMEs	4	17

The cross tabulation shows that twice the number of companies serving large clients underwent some environmental training. The Chi-squared test on the two variables showed a $\chi^2 = 0.892$. This indicates a high dependence between the two variables. Large customers, who work with environmental targets, would need the support of its partners, for which they can invest in the improvement process.

This is supported by some of the open-ended responses. One owner said that it was mandatory to attend environmental training for their key employees, which is arranged for by their customer - GE Healthcare. Another supplier to Tata Autocomp said that environmental performance is part of the vendor evaluation and they have to attend training on this.

5.5 Assessing the Attitude towards the environmental practices

Various questions were asked which aimed at understanding the attitudes of the respondent towards environmental practices in general and within his business. These questions were based on a 5 point Likert Scale. The internal reliability of the questions was tested using the Cronbach's alpha. This is reported in the earlier chapter in the section on Reliability of the questionnaire.

The questions for attitudes measurement had 9 missing values which reduced the n to 51 samples. Attitude measurement questions were given marks and these were added up into the Attitudes Score. The Attitude Score for the respondents ranged from -2 to 20, with a mean of 7.69 ± 4.329 . This was a large range to work with statistically and thus, the scores were grouped into three levels. Those with less than 6 marks were clubbed into Negative

attitude, those upto 11 marks were Indifferent Attitude and those above 12 were Positive attitude. The number of companies in each class of Attitude is shown in table below

Table 13: Number of respondents in each Attitude Class

Attitude Class		Frequency No. of companies	Percent
Valid	1 Positive	11	18.3
	2 Indifferent	19	31.7
	3 Negative	21	35.0
	Total	51	85.0
Missing	System	9	15.0
Total		60	100.0

As seen, just 18% of the respondents demonstrated a positive attitude while 35% showed a negative attitude. This is an area of concern. This suggests that regulations are not considered with a positive attitude. This issue needs to be addressed by policy makers, since any regulatory matters will face this negative test.

In one question, the respondent was asked to rate on a 4 point Likert scale, his agreement or disagreement to the following statements, responses are noted below

Table 14: Responses to statements on Attitude

(a) Industrial activities are responsible for environmental degradation		Frequency	Percent
Valid	Disagree	2	3.3
	Somewhat Agree	21	35.0
	Strongly Agree	29	48.3
	Total	52	86.7
Missing	System	8	13.3
Total		60	100.0

(b) SMEs do not have a significant impact on the environment		Frequency	Percent
Valid	Strongly Agree	6	10.0
	Somewhat Agree	12	20.0
	Neither Agree nor Disagree	16	26.7
	Disagree	22	36.7
	Total	56	93.3
Missing	System	4	6.7
Total		60	100.0

For statement (a) 48% were in strong agreement and a 35% somewhat agreed. This shows a significant portion of SMEs being aware of the relation between environmental degradation and the industry. This is interesting to note, more because there was a high percent of negative attitude in the respondents.

On the other hand responses for statement (b) show about 30% of the respondents do not feel that SMEs have a significant impact on it. This feeling by SMEs is supported by research in other countries where findings are that SMEs have small operations and scale which helps keep their impact on the environment to be insignificant. The point missed by the SMEs here is that their sheer numbers can make their impact far more than a few large manufacturing companies. As seen in the earlier section, in Pune itself, it is estimated that there are over 5000 companies which meet the sample requirements. The MSME report for 2011 puts the all India MSME number at over 4 million. This is surely not a number to be ignored and strengthens the purpose of this research – to help provide a facilitative framework for SMEs to improve their environmental performance.

5.6 Awareness and Attitudes are they independent?

With the respondents' assigned levels of awareness and of attitude, it is possible to statistically see if they are independent of each other. For this purpose, these levels were cross tabulated with each other (Table)

Table 15: Cross-tab of Level of Awareness & Attitude Class

Cross tabulation of Level of Awareness AND Attitude Class		AttitudeClass			Total
		Positive	Indifferent	Negative	
Level of Awareness	High Awareness	5	4	3	12
	Mid Awareness	2	11	13	26
	Low Awareness	4	4	5	13
Total		11	19	21	51

Further, running the Chi Squared test yielded a $\chi^2 = 6.783$ with $p=0.144$. This accepts the null hypothesis that there the two variables are independent of each other. This suggests that merely a high awareness may not ensure a positive attitude towards environmental practices. It is noteworthy that the Mid awareness level companies are more in number in

indifferent attitude. This is a ‘stuck-in-the-middle’ syndrome, where these companies are not aware of the problems and they have an indifferent attitude towards them.

5.7 Green practices in the product life cycle

This was the main section of the questionnaire. This gathered the green practices which the company undertook within each stage of the generic product life cycle. The pre-sustainability era of environmental management focused more on greening within the scope of manufacturing activities. This meant lowering emissions and reducing the use of energy, water and materials. This benefitted the environment while saving costs for the company. However, not all technologies are cost saving; thus, controlling emission had to be standardized through the regulatory framework.

The conceptual framework proposes that the numbers of activities which span across the product life cycle are a moderating variable towards the Green performance of the company. The generic stages of the product life cycle are as depicted below (see figure). There were 6 sections each one asking questions pertaining to the product life cycle.

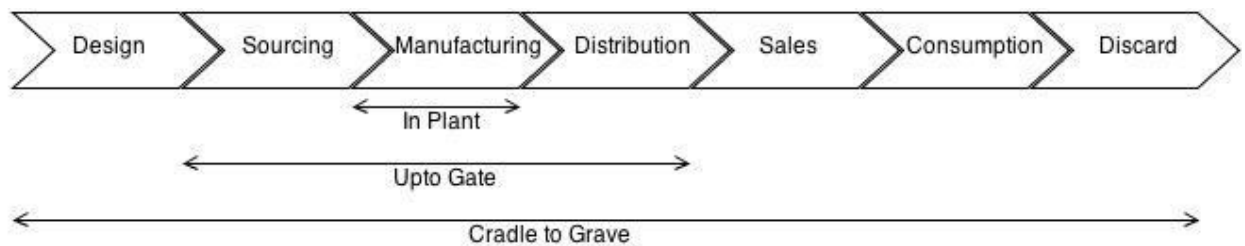


Figure 15: Green Practices within the Generic Product life cycle

As suggested by the researcher, focusing only on manufacturing is the ‘in my plant’ approach. Involving one’s supply chain (forward and backward) into it is more of a ‘upto my gate’ approach. While incorporating green activities from design stage of the product to the discarding of it, is really taking the ‘cradle to grave’ approach. It was important for this research to see which stages of the product life cycle SMEs undertake green activities and is there a correlation to the green performance, and eventually to the competitive advantage.

5.8 Product life cycle – Strategic Approach to Green Practices

The Product life cycle questions section started off by finding out if the company had a strategic approach towards green practices. This was meant to ask whether the environment was a part of their vision or mission statement and if they involved their employees in environmental improvement suggestions and similar topics. The responses are shown.

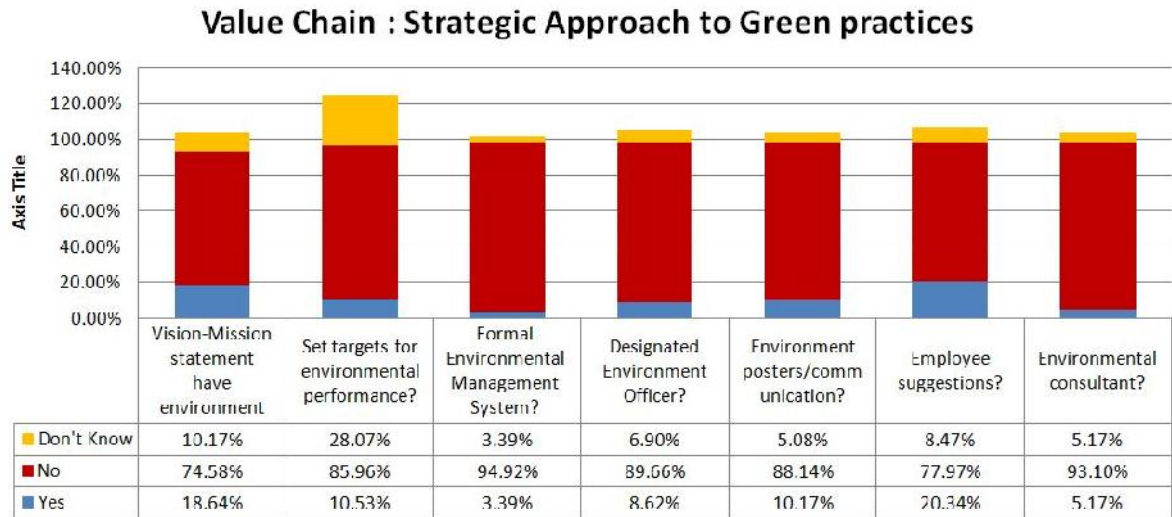


Figure 16: Strategic Approach to Green Practices

Over 74% of the respondents did not have the environment as part of their vision or mission. What is surprising is that 18% did have. One company who did have the environment in its vision was Intelux Electronics Pvt.Ltd. The Mission statement of the company is reproduced below

“The “Intelux” family of employees, vendors and co-makers will acquire and pursue ‘good manufacturing practices of international standards. These practices will be persuaded by all the employees through sound health and higher levels of spiritual grounding so that they are as conscious of the environment and social obligations as they are of customers and markets.”

This company supplies to GE Lighting division, which is its largest client. GE’s vendor qualification and periodic vendor audits have environmental performance. When asked if

this was the reason why environment was mentioned in the Mission, Mr. N.S.Rao, MD of Intelux denied. He said that they were spiritually inclined and he himself was a great disciple of a spiritual Guru. This is the reason why, he said, that spirituality and the environment are embedded into their business activities.

85% companies did not have any environmental performance targets. They were asked if they had any energy savings or waste lowering targets, but they did not. This suggests that environmental performance improvement is not considered or seen as a business benefit by a majority of SMEs.

11 companies had the environment in their Vision or Mission statements. To check if these 11 companies served customer types Large or Small, a cross tabulation was done on this question and the Customer type. The results are displayed in the table below. Of the 11 companies, 8 served mainly large customers, while 3 served small ones. On the other hand, of the 49 companies who did not have environment in their vision or mission, 31 served large customers.

Table 16: Cross-tab of Respondent by Cust_Type and mention in Vision/Mission

Respondent by Cust_Type	Is environment mentioned in Vision, Mission?		Total
	Yes	No	
Companies serving mainly large customers	8	31	39
Companies serving mainly SMEs	3	18	21

The other cross tabulation that was run, was on Vision Mission question and the Awareness Level of the companies. This too is not conclusive.

Table 17: Cross-tab of Respondent by Level of Awareness and mention in Vision/Mission

Respondent by Level of Awareness	Is environment mentioned in Vision, Mission?		Total
	Yes	No	
High Level	4	8	12
Mid Level	7	24	31
Low Level	0	17	17

The researcher asked a few respondents (who had answered yes to the Vision Mission question) what motivated them to take up environment in their Vision Mission statements. The answer from 2 respondents was that they personally felt the need for environmental improvement.

5.9 Product life cycle - Design stage

This section asked questions to understand whether the company had environmental considerations in the product design stage. The graph below shows the responses.

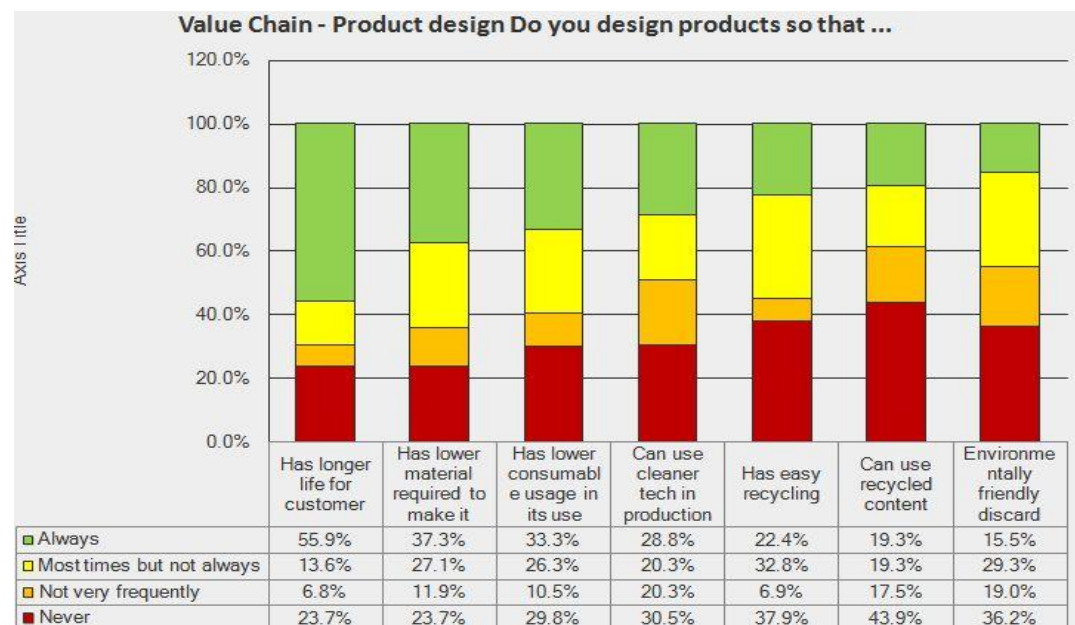


Figure 17: Responses to question on Green Practices at Design Stage

As seen from the responses, few respondents had green practices within the design stage. This is not surprising since SMEs generally follow the path what their customers ask for, and if there is no environmental design practices asked for, then it is unlikely that the companies would have them in their process.

Nearly 56% of the companies always designed products for longer life. This is environmentally beneficial since increased life for customers means lower consumption of resources. Recently, there is an outcry from sections of environmentalists over what are termed as ‘use and throw’ products. These consumer products promote short customer life cycle, which means they buy more products more often. This increases the load on resources while generating waste in the process. In b2b, there is a pressure to produce products lasting longer, and this acts in favor of the environment. Similarly, the next one is designing products for lower material content. This would lower resource requirements effectively saving the company money.

Most activities in the Product design section, would help make the SMEs products more competitive, and hence it is understandable that so many companies have these considerations in the design stage.

5.10 Product life cycle - Process Waste & Emissions Practices

This section asked questions if they generated process waste, fumes or effluent. The respondent had to say if they did, then was it treated, or left untreated. The chart below shows the responses received.

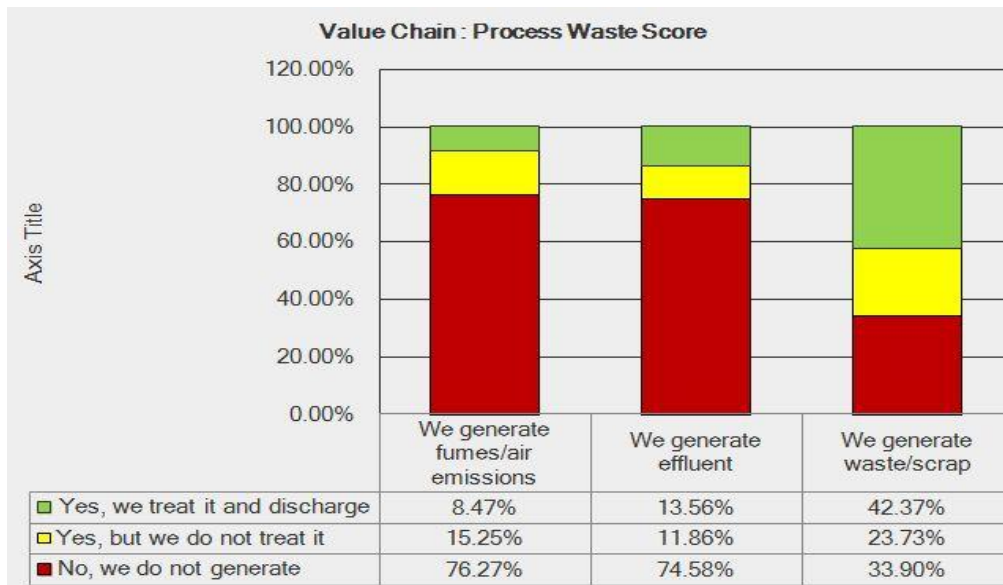


Figure 18: Responses to question on generation and treatment of waste

The number of companies which treated their fumes is 8.47%, and those which did not treat fumes was 15.25% . This is almost double. On the other hand, in effluent, 13.56% treated their effluent before discharging, while 11.86% discharged it without treating. Air emissions could be treated by fewer companies either because of low awareness, less enforcement or that it is expensive to treat.

It is not expected that the responses to this section is completely dependable, considering that there could be a legal implication for this admittance.

5.11 Product life cycle – Monitoring green practices

In this section five areas of monitoring were asked – energy, water, waste, indirect energy, indirect water. Further, the respondent was asked at what level is monitoring happening – aggregate, department or machine level. The results are depicted in the chart below

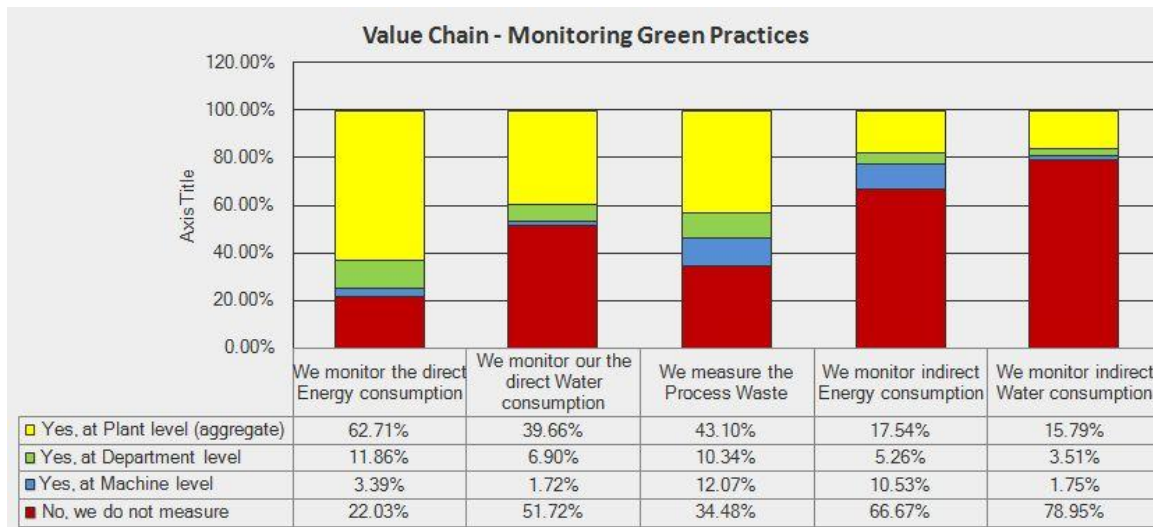


Figure 19: Responses to question on Monitoring practices of green activities

51.72% companies did not measure their water consumption compared to 22% not measuring energy consumption. This reason why this is skewed is probably the low price of water for industrial activities as well as the abundance of it. In any case, monitoring water use and reducing it does not have the saving potential that energy has. There is a popular opinion that water is significantly underpriced for Indian industry. This needs to be corrected, either by pricing it higher or making it mandatory.

5.12 Product life cycle –Practices during Sourcing

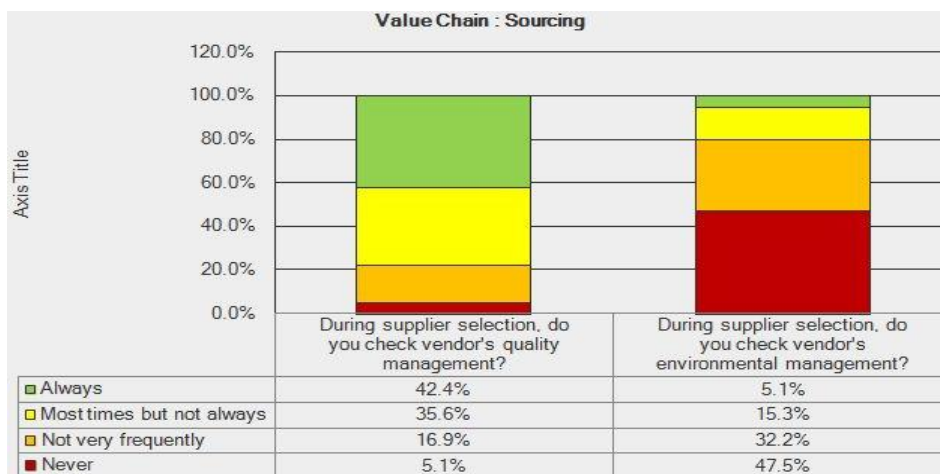


Figure 20: Responses to question on Green Sourcing Practices

Only 5% of companies did not check their supplier's quality management processes, on the other hand, only 5% did check their vendor's environmental management process. This also supports the earlier proposition that environmental performance improvement is not considered or seen as a business benefit by a majority of SMEs.

5.13 Product life cycle – Impact of green practices within the last one year

This section tried to understand the business impacts of green practices that the companies were undertaking till now. The highest impact was understandably '*reduced energy consumption per unit*'. This is a cost saving and hence a practice which is most often pursued. 7 companies used more recycled content thus saving money. There were 8 companies who stopped making products which were environmentally damaging.

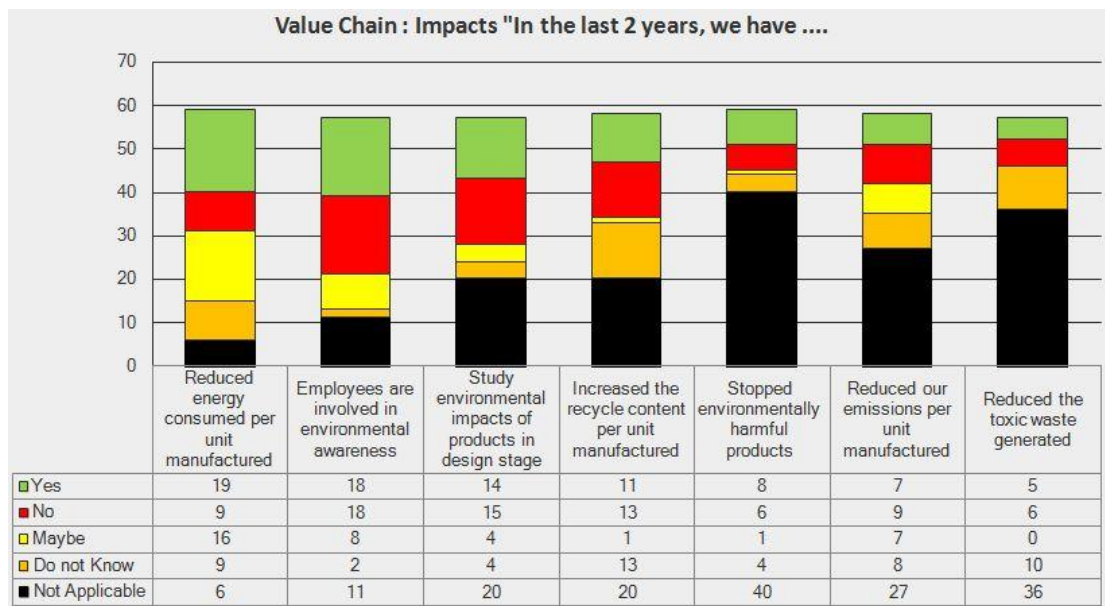


Figure 21: Responses to question on Green Impacts in last 2 years

5.14 Product life cycle – Recognition

Have the companies efforts been appreciated by their customers or association or trade body? This was considered as a good indicator of practices. Thus, the companies were asked if they had won an award or recognition in the last 2 years, in quality, environment or social practices. While 28% had received an award in Quality management, just 2% had received it in environmental practices. The low figure could be either because there

are far less awards instituted for environmental practices within SMEs, or because not as many SMEs undertake practices worth being recognized, or it could be a combination of both these factors. In any case, this finding shows that recognition should be improved, to help diffuse environmental practices within SMEs.

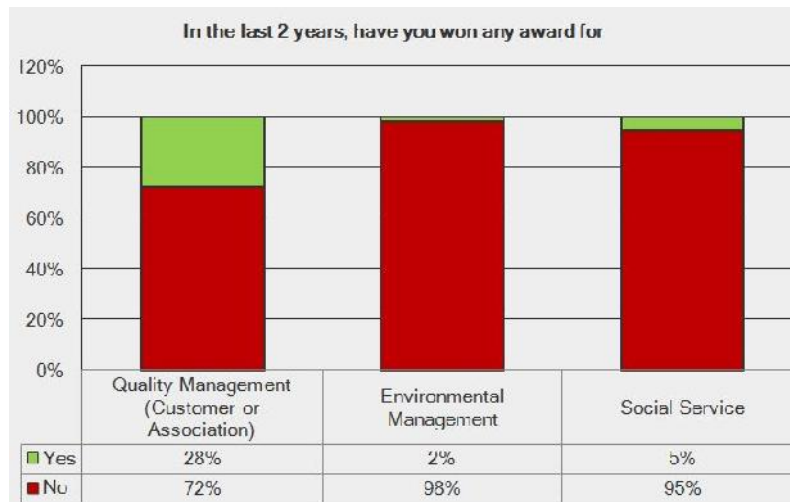


Figure 22: Awards and recognition for various practices

5.15 Product life cycle – Communicating efforts to Customers

Prior research suggests that for green efforts to result in a preference from customers,

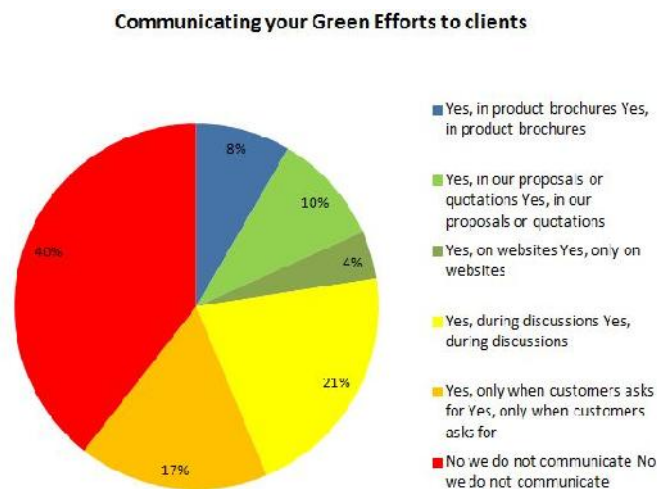


Figure 23: Responses on Communicating Green Efforts to Clients

they need to be communicated. It is reasonable to assume that if clients do not know of an

SME's environmental efforts, then it is highly unlikely that they will offer any preferential treatment for that company.

For this reason, the respondents were asked if and how they communicated their efforts. 40% said they do not communicate, while only 8% mentioned these on their brochures and promotion material. 4% mentioned these on their websites. There seems to be either lack of reason for communication with customers or else they do not feel that this would result in any benefit.

5.16 Assessing the Level of Green Performance of the company

All the responses discussed above, were given marks. Each section was totaled up and a score was given for the company. All the Scores are listed in the table below, with a description. As is seen, each score is given a name and the maximum score possible for each one is also shown. All these Scores were then totaled up and one Green score was computed. This was termed as the GreenScore. This helped understand the performance of the company within the product life cycle.

Table 18: Scheme of Scoring & Names for Green activities in Product life cycle

Score Name	Questions	Maximum Score possible
<i>Strategic Approach Score</i> SA_Score Q21	Is environment considered in Vision-Mission statements, environmental targets, in-house communication, employee participation, environmental consultant? (q21)	7
<i>Process Waste Score</i> PW_Score q22	Generation and treatment of fumes, effluent and process waste (q22)	3
<i>Green Tools Score</i> GT_Score Q17	This set of questions find out the use of tools like Lean, Six Sigma, WCM, EMS, life cycle assessment, CII GreenCo rating, Carbon footprint and Ecological footprint.	10
<i>Monitoring Score</i> M_Score Q23	How well does the company monitor its energy, water and waste and at what level – aggregate, department, machine?	15

<i>Product Score</i> <i>PD_Score Q25</i>	<i>Design</i>	Designing products for – lower material, energy, consumables, longer life, clean tech, more recycled content, more recyclability, easy discarding.	14
<i>Sourcing Score</i> <i>So_Score Q26</i>		Are the SMEs vendors qualified on QMS and EMS?	4
<i>Impacts I_Score</i> <i>Q27</i>	<i>Score</i>	What impacts of green practices were observed in last one year – lower energy, material, waste, effluent, fumes, more recycled content, stopped products with toxic waste	14
<i>Recognition R_Score</i> <i>q28</i>	<i>Score</i>	Awards or recognitions received related to environment, society, quality were noted	3
<i>Communications Score</i> <i>C_Score q29</i>		This enquires if the green approach is communicated to customers	5
<i>Total Green Score</i> <i>GreenScore</i>		Sum of all above scores	75
<i>Company's Green Performance (L_GP)</i>	<i>Level of</i>	Less than 17 marks = Low level L3 Between 17 and 29 = Mid Level L2; Above 30 marks = High Level L1	

The GreenScore values had a mean of 18.93±12.463, the descriptive statistics are shown in the table below.

Table 19: Descriptive Statistics of GreenScores of all respondents

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
GreenScore	60	-8	46	18.93	12.463
Valid N (listwise)	60				

This indicates a large variation in the green performances of the respondent companies. Such a large variation would not be useful in statistical analysis and hence the scores were then clubbed into three levels. A histogram of the scores was plotted and this helped to distribute the scores into the three levels. Companies with scores above 29 marks were assigned Level 1; companies from 17 to 29 marks were assigned Level 2 while those scoring less than 17 were assigned Level 3. The number of companies falling at each level is shown in table below.

Table 20: Clubbing respondents into Level of Green Performance

Level of Green Performance		Frequency No. of companies	Percent
Valid	High (>29 marks)	12	20.0
	Mid (17 to 29 marks)	23	38.3
	Low (<17 marks)	25	41.7
	Total	60	100.0

The three groups formed can now be tested for dependency or correlation on various parameters which can be tested with statistical methods.

5.17 How many stages of Product life cycle do the Green Practices spread across?

Practices of reducing energy, waste and emissions have found wide acceptance in small and large companies alike. Waste is an indicator of efficiency, energy saved is money earned and lower emissions reveal more efficient utilization. Increasing efficiency saves money or labour or space or some other valuable resource. These activities are often within the scope of manufacturing activities. Their potential to save costs is easily seen. Moreover, waste reduction is tangible, measurable and is hence something ‘to act on’. Most often there are well known practices and technologies in place too. Due to these reasons, green practices are profusely seen in the manufacturing stages. However, the other product life cycle stages in business may not directly save costs. For example, designing products for lower material consumption or use of cleantech, may not be cheaper than present practices, greening the supply chain or communicating green efforts in sales programs can be expensive. Based on this argument, this section of the questionnaire asked respondents how their green activities were spread within the product life cycle of their businesses. For this purpose, 1 mark was given when the respondent has a positive non-zero score in the product life cycle. In this manner, the number of stages of the product life cycle where the company had green activities was noted. The frequencies of this are shown in the graph below.

Number of stages in Product life cycle	Frequency	Percent
Valid 2	4	6.7
3	6	10.0
4	7	11.7
5	12	20.0
6	14	23.3
7	11	18.3
8	3	5.0
9	3	5.0
Total	60	100.0

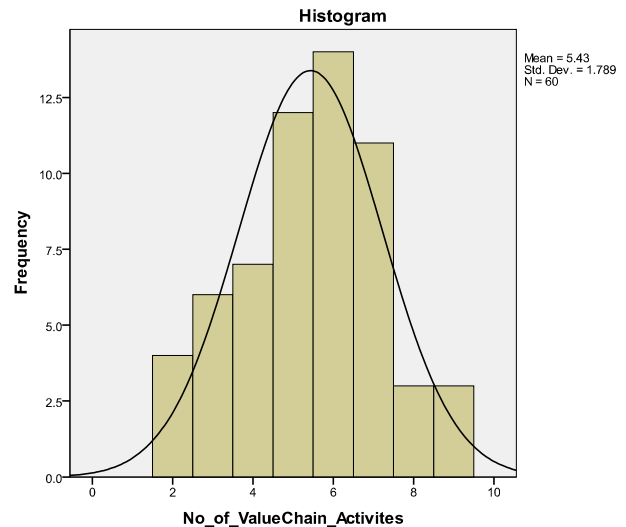


Figure 24: Histogram and frequency of firms and number of activities in the Product life cycle

As seen, 61.6% companies have green activities in 5 to 7 stages of the product life cycle while just 5% have them across 8 and another 5% have across 9 stages. The table below shows the number of companies practicing green activities within the product life cycle.

Table 21: Number of companies practicing green activities in each stage of Product life cycle

Stage in the Product life cycle	No. of companies
Strategic Approach	25
Design	44
Sourcing	37
Manufacturing	59
Sales	30

Manufacturing had 59 respondents while green practices were followed in Design stage within 44 companies. 25 companies had a Strategic Approach towards green practices. The least number practiced them in Sales, which had 30 companies. This shows that green activities are the most diffused in manufacturing and less in other stages. The higher occurrence of Green design practices is explained earlier – most green design

activities increase the competitiveness of the company's products, and hence this features high.

5.18 Testing Hypothesis 1: Awareness and environmental performance - are they independent of each other?

This research has proposed the Hypothesis H1 - 'An SME's environmental performance is dependent on the awareness of the owner towards the industry environment relation.' To test this hypothesis, the means of the GreenScores were compared between the three groups of awareness using the Kruskal-Wallis non-parametric ANOVA. This test is used to determine whether the samples are from same or different populations. The test yielded the results depicted in the table 22.

Table 22: ANOVA – Level of Awareness and GreenScores

	Level of Awareness	N	Mean Rank
Green Score TOTAL	High Awareness	12	48.38
	Mid Awareness	31	29.76
	Low Awareness	17	19.24
	Total	60	

Test Statistics ^{a,b}	Green Score TOTAL
Chi-square	19.728
Df	2
Asymp. Sig.	.000

a. Kruskal Wallis Test

b. Grouping Variable: Level of Awareness

The mean GreenScores of the three groups of Awareness are shown in table 1 while the $\chi^2=19.728$, $p=0.000$ shows a highly significant difference in the means. This accepts the Hypothesis H1 proposed by this research. This finding is of significance, since 31 respondents are in the mid and low level of awareness. This condition is similar to the time when awareness of safety in SMEs was low, which caused human suffering and loss of man-hours.

Similarly, to determine the whether the means of the three Attitude Class companies are different, the Kruskal-Wallis non-parametric ANOVA was conducted on AttitudeClass and the GreenScores. The results are shown in the table 23.

Table 23: ANOVA on Attitude Class and GreenScores

AttitudeClass		N	Mean Rank
GreenScore TOTAL	Positive	11	27.91
	Indifferent	19	26.42
	Negative	21	24.62
	Total	51	
Test Statistics^{a,b}	Green Score TOTAL		
Chi-square	.378		
df	2		
Asymp. Sig.	.828		

a. Kruskal Wallis Test

b. Grouping Variable:
AttitudeClass

The test accepts the null hypothesis for this test namely that the means of the GreenScores for each AttitudeClass are not different. This finds support in some previous research which suggests that attitudes may not be good predictors of behavior. Some studies suggest factors responsible for attitudes translating into behavior. The four factors are Specific v/s general behavior, person who is being asked; situation (when and how) being asked in and how was the attitude formed. The researcher feels, that under the situation of this study, the factors are not conducive to predict behavior from attitude because of the following reasons: (i) a specific behavior is required for the business to undertake green practices. As opposed to that, the questions related to attitude were general and not checking the specific behavior (ii) the situation in which the respondent is made to respond to a set of questions, is likely to put up a positive attitude, even though the intent is missing.

This finding is consistent with the earlier studies which have shown a positive relationship between environmental awareness and environmental practices for SME owners (Peters & Turner, 2002) (Williamson & Lynch-Wood, 2006). The research by Gadenne et al (2008) too suggests that general environmental awareness is positively associated with environmental systems practices and conservation practices. In addition,

some studies have found that a lack of awareness of SME's impact on the environment may hinder the implementation of an environmental management system (Hillary, 1999) (Gerrans & Hutchinson, 2000)

5.19 Testing Hypothesis 2: Customer types and environmental performance

Hypothesis 2 (H2) of this research is: *SMEs serving large customers have a better environmental performance than those serving small customers.*

As reasoned in the earlier section, some earlier research suggests that customers can drive environmental performance in SMEs. In the exploratory interviews, the responses suggested that large clients have vendor qualification and appraisal process, which are likely to have environmental performance as a criterion. Thus the hypothesis as stated above is proposed by this researcher. To test the hypothesis, the Kruskal-Wallis non-parametric ANOVA was conducted on CustType and GreenScores. The results are shown in table 24.

nCustType		N	Mean Rank
Green Score	1	17	25.00
TOTAL	2	38	33.95
	3	5	23.00
	Total	60	

Table 24: ANOVA – GreenScore and Cust_Type

	Green Score TOTAL
Chi-square	4.095
df	2
Asymp. Sig.	.129

a. Kruskal Wallis Test

b. Grouping Variable:
nCustType

The statistical test rejected the hypothesis H2. The means of GreenScores of the three groups of respondents by customer type are not different.

This rejection suggests that large customers can drive improved performance; however there are significant number of companies serving SMEs, who also have similar performances. The rejection when analyzed together with the highly significant difference in means of GreenScore between the different awareness levels, suggests an explanation. The explanation suggested by this researcher is a high level of awareness

brings out the behavior to ‘do something about it’. This drives behavior more than what customers can.

5.20 Levels of Green Performance (LGP) – are they different groups?

The clubbing of GreenScores into three levels was tested to see if the mean of individual scores are different between them. To check this, the means of each individual Scores, was compared, between the three levels. The Kruskal-Wallis non-parametric ANOVA test was deemed the most appropriate for this test. Table 25 shows the results.

	Level of Green Performance	N	Mean Rank
Green Tools q17	High	12	43.67
	Mid	23	32.13
	Low	25	22.68
	Total	60	
Strategic Approach q21	High	12	44.00
	Mid	23	28.50
	Low	25	25.86
	Total	60	
Process Waste q22	High	12	33.67
	Mid	23	30.76
	Low	25	28.74
	Total	60	
Monitoring q23	High	12	34.21
	Mid	23	33.33
	Low	25	26.12
	Total	60	
Product Design q 25	High	12	45.79
	Mid	23	38.13
	Low	25	16.14
	Total	60	
Sourcing q 26	High	12	43.50
	Mid	23	32.11
	Low	25	22.78
	Total	60	
Impacts q27	High	12	51.17
	Mid	23	33.28
	Low	25	18.02
	Total	60	
Recognition q28	High	12	33.29
	Mid	23	31.67
	Low	25	28.08
	Total	60	

Communications q 29	High	12	46.17
	Mid	23	29.74
	Low	25	23.68
	Total	60	

Table 25: ANOVA – Level of Green Performance and Individual Product life cycle Scores

Test Statistics a,b	Chi-square	df	Asymp. Sig.
Green Tools q17	12.144	2	.002
Strategic Approach q21	11.731	2	.003
Process Waste q22	.702	2	.704
Monitoring q23	2.779	2	.249
Product Design q 25	30.856	2	.000
Sourcing q 26	12.571	2	.002
Impacts q27	30.955	2	.000
Recognition q28	1.362	2	.506
Communications q 29	16.248	2	.000

a. Kruskal Wallis Test

b. Grouping Variable: Level of Green Performance

5.21 Interpretation and discussions on the non-parametric ANOVA Table 25

Of the 9 individual scores whose means were tested, 3 scores showed highly significant differences (bold italic) in the mean and 3 showed significant differences (bold) while 3 scores showed no difference in the means between the three levels of Green Performance. Those scores which did not show difference in the means were the Process Waste Score, Monitoring Score and Recognitions Scores. A high process waste score was driven by two factors – (i) opportunity of saving costs, since reducing waste meant saving, (ii) compliance. Therefore the scores are likely to be similar between the three groups. The monitoring score is related to the process waste, since the old adage of ‘what’s measured, improves’ holds good. So for a similar reason, we are likely to see similar means in this score too. The last one – Recognition score, had respondents getting marks for mainly the Quality awards. Only 2% companies had won any award or recognition for environmental performance. Thus, this score captures quality practices rather than environmental practices in the respondents, which is why the means could be no different in the three levels.

The Green Tools Score, Strategic Approach Score and Sourcing Score showed significant differences in their mean, between the three levels. Companies scoring high here showed a larger scope of green practices within their companies.

The Product Design Score, Impacts Score and Communications Score showed a highly significant difference between their means. This brings out two important points in this research – incorporating environmental practices in the design stage and communicating green efforts with clients, can help companies outperform their competitors on green performance. This is an important finding, since most SMEs have traditionally been addressing regulatory compliance, which requires activities spanning only the manufacturing process. Since environmental consideration in product design was not regulated nor expected, this has been left out of green practices. This finding finds support in the fact that several start-up companies position themselves on making environmental friendly products. While there is only a small niche segment, nevertheless, these products fetch a premium over competitors. Similarly, many large companies have declared environment friendly product designs or green product ranges also. These activities lend credibility to the fact that SMEs need to push green practices beyond manufacturing and into designing.

The other important finding here is that the company's green efforts need to be communicated to clients, if any benefit is expected. When this researcher asked the respondents why they did not communicate, the surprising answer was that they did not consider it important. In the later section, the Communications Score is tested for dependency with GreenBenefits Score.

The last score which showed highly significant difference in the means was the Impacts Score. This score marked the respondent on the impacts achieved of green practices. Since this was directly a result of green practices, it is not surprising that this Score showed a highly significant difference. This test shows that the companies with different levels of green practice are highly likely to see different impacts from them.

5.22 Testing Hypothesis 3: Internal barriers to green performance

This research considered it an important factor (See the conceptual framework) to understand what could be the potential barriers for an SME which may prevent it from undertaking green practices. Prior research suggests that cost is a major barrier. Compliance of standards is expensive, since the investments here may not directly affect product quality or result in cost reduction. In the questionnaire, the respondents were asked to rate 9 barriers on a 4 point Likert scale from 'Strongly responsible' to 'Not responsible'. The nine barriers listed in the questionnaire are:

- a. Finances locked up in business activities – SME research has time and again shown that small companies are often financially constrained, with long working capital cycles, limited fund availability and (Author, 2007) (Bouri, 2011)
- b. Lack of knowledge. Awareness about environmental management – As discussed in the earlier section, awareness and green performance of the company are highly dependant on each other.
- c. Lack of required skills – Jobs with small companies are not the most attractive – they can neither compete with the remuneration of large companies nor do they offer the career paths that large companies do. This means that talent availability for SMEs is limited. Often, employees grow skills on the job. Acquiring skills not directly useful to the job, is not often undertaken.
- d. Competitive pressures – In one question the respondent was asked if they thought their competitors comply with environmental regulations. Here, 45% respondents strongly agreed that competitors do not comply to regulations. This could place pressures of cost, since not complying to norms, in most cases, is cheaper. Hence this factor was introduced here as a possible barrier.
- e. Lack of time – Many studies on performance of SMEs have suggested that the owners micro manage the activities, which leaves no time for them in business development work. With such time pressures, it is hardly expected that they can think of sustainability of their operations.
- f. Unattractive return on investments – The exploratory study showed that even large corporations evaluate their environmental investments based on the return that the investment offers. An example is that of Persistent, where the respondent

said that they decided on a particular energy saving technology, only when their prices came down and allowed an ROI within 2 years. There is no reason why SMEs would not conduct an ROI analysis before investing.

- g. Lack of government support – for this question, the respondents were asked what they meant by government support. As happened with ISO 9000 certification some years back, this was an expensive and a highly disruptive certification system for SMEs. Once it was incentivized by the government, only then did it find widespread acceptance. On a similar note, the National Productivity Council (NPC) carries out a campaign on safety in industry, which has gained popularity and educated the small companies.
- h. Lack of industry support – here it was asked if they felt that trade and commerce associations would have had any effect on green practices.

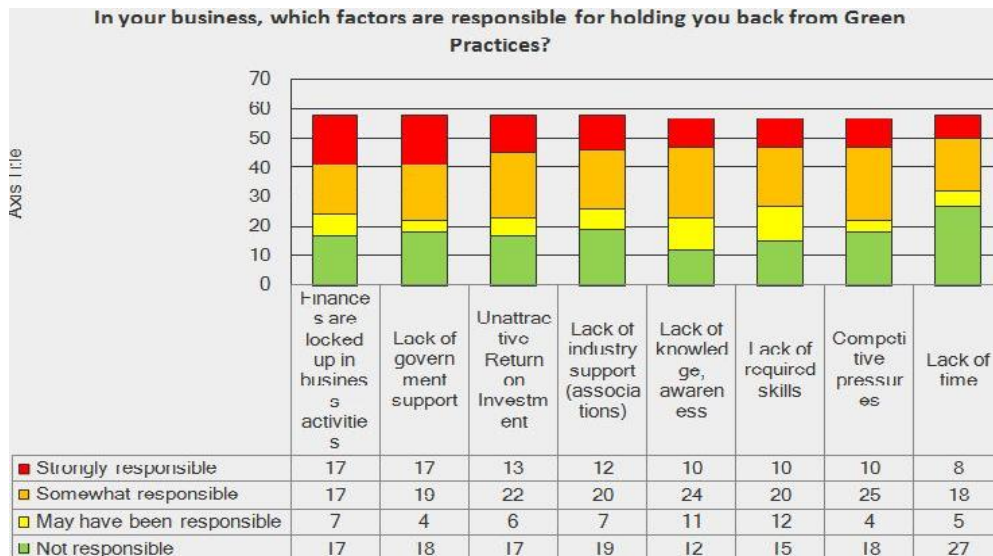


Figure 25: Responses on Barriers to Green Performance

Of these, the four barriers are Internal to the company (Finances, awareness, skills and time) while the other four are in the External environment of the company (Competition, ROI, govt support, Industry support). The internal barriers need to be identified since the company would have some control on them. On the other hand, the company can only respond towards the external barriers, since these are beyond the company's control.

Of the internal barriers, the most important is the barrier of finance, closely followed by the barrier of knowledge and awareness. The barrier of finance can be one that is possible

to overcome, through the recommendations given in the concluding section. The barrier of awareness shows up in this section too. In the earlier section, respondents were clubbed into three levels of awareness, based on their responses to the questions on awareness. 10 respondents feel that lack of requisite skills is strongly responsible while 20 respondents feel it is somewhat responsible. This also turns out an important factor, one which can be addressed through policy or government support. The researcher has made recommendations in the concluding section. 27 respondents said that lack of time was not responsible. This goes against some prior studies which suggest that due to micro-management, SME owners have very little time for business development work.

The biggest external barrier is considered to be lack of government support. When the respondents were asked (not from questionnaire) what sort of support they wished to have, some said financial, while others said help in identifying opportunities, another one said that government can support by prioritizing or reducing lending costs for clean technologies. One respondent, the M.D. of Filteron India Pvt.Ltd. said

“Government should offer financial incentive for SMEs who undertake EMS certification. This is benefitting the SMEs, the environment as well as the national economy, since ISO 14000 certified companies gain an advantage in global business opportunities.”

If this is instituted, it can have the potential to positively affect the barrier of ‘unattractive return on investment’. About the barrier competitive pressures, this can be dealt with by increasing the general awareness. We have seen instances in the history of industrialization that positive practices can diffuse within the market. Lack of industry support was another external barrier that can be addressed. The SME owners were expecting support from trade organizations or chambers of commerce which are facilitative in nature for SMEs with limited or no skills in identifying or implementing environmental performance improvement measures.

The research has proposed the third hypothesis as ‘*Multiple internal barriers hold SMEs back from improving the company’s green performance.*’ While there is no statistical test to accept or reject the Hypothesis H3, the above analysis suggests that there are multiple internal barriers which do indeed hold back SMEs from improving their performance.

5.23 Benefits from green practices

Based on prior research and the exploratory studies with large companies and SMEs, a list of 13 possible benefits arising out of green practices was made. The option of ‘Others’ was also given to the respondent. The response was requested on a 4 point Likert scale thus ‘*strongly benefited us, somewhat benefited us, can’t say, not benefited us*’.

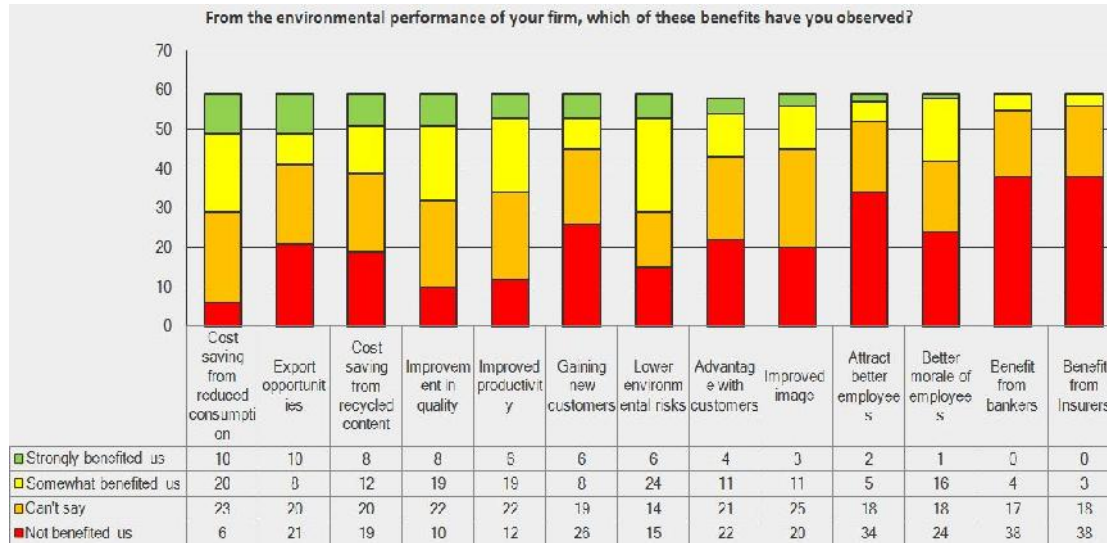


Figure 26: Responses to Benefits from Green Practices

Cost saving had strongly benefited 10 companies and somewhat benefited 20. Export opportunities were a strong benefit with 10 companies while cost saving from use of recycled content benefited 8 companies strongly and 12 companies somewhat. Improvement in quality and productivity was another benefit strongly observed by 8 companies each. On the other side, there was no benefit from bankers or insurers for 38 companies. This clearly suggests that there is a need for policies or incentives which can help gain these benefits. Without policies or incentives, neither the company nor the banker or insurer has a reason to promote green practices.

As the central theme of this research is to identify whether green practices can lead to a competitive advantage, the benefits were classified based on Michael Porter’s generic strategies for companies. Benefits were classified into those that helped lower costs and those that helped differentiate the company. The table below shows the classification.

Table 26: Classifying Benefits by generic Competitive Advantage

Benefit	Lower Cost / Reason Differentiation		
Cost saving from reduced consumption	Lower advantage	Cost	This lowers the cost of production
Cost saving from recycled content	Lower advantage	Cost	This lowers the cost of production
Improvement in productivity	Lower advantage	Cost	This lowers the cost of production
Benefit from bankers	Lower advantage	Cost	This lowers the companies cost of operations
Benefit from insurers	Lower advantage	Cost	This lowers the companies cost of operations
Lower environmental risks	Lower advantage	Cost	This lowers the companies cost of operations
Improvement in quality	Differentiation advantage		This helps differentiate the company on quality
Advantage with some present customers	Differentiation advantage		This helps companies differentiate themselves with a segment of customers seeking green vendors
Gaining new customers	Differentiation advantage		This helps companies differentiate themselves with some existing customers
Export opportunities	Differentiation advantage		This helps companies differentiate themselves with a segment of customers seeking green vendors
Improved image	Differentiation advantage		This helps companies differentiate themselves within their industry
Attracting better employees	Differentiation advantage		Better talent is likely to result in a differentiated advantage for companies
Better morale of employees	Differentiation advantage		Better morale is likely to result in an innovative work force

Based on the above classification, the respondent's benefits were given marks and scores were computed for 'Cost advantage Score' and 'Differentiation advantage Score'. These scores were then tested with the Level of Green Performance computed earlier.

5.24 Cost Advantage Score and the Differentiation Advantage Score

The analysis of these scores for the respondents brings up some interesting findings.

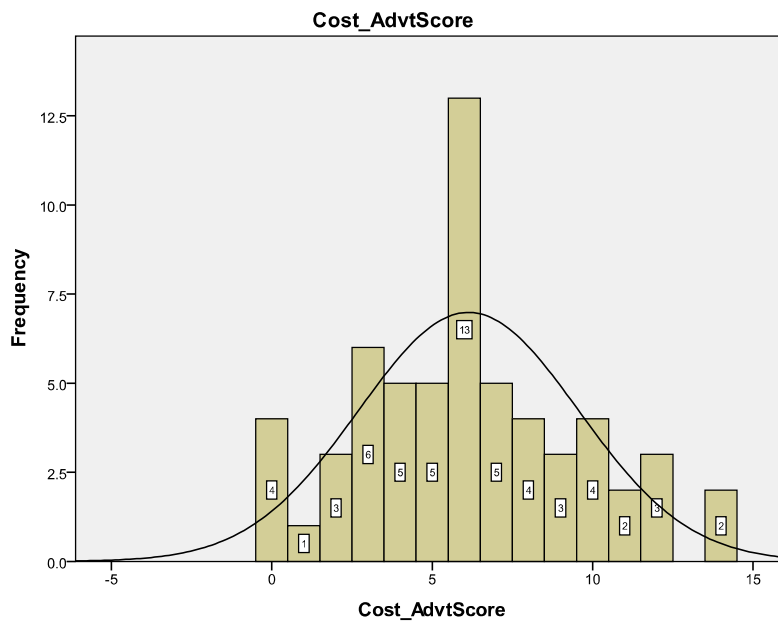
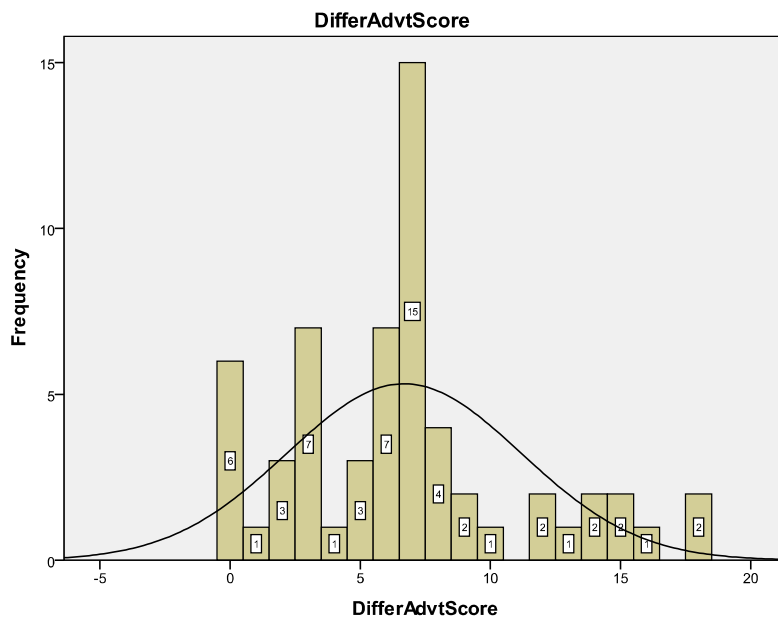


Figure 27: Histograms of Cost_Advt Score and Differentiated_Benefits Score



	N	Range	Minimum	Maximum	Mean	Std. Deviation
Cost_AdvtScore	60	14	0	14	6.13	3.427
DifferAdvtScore	60	18	0	18	6.68	4.500
Valid N (listwise)	60					

The Cost advantage score (Cost_AdvtScore) curve is more normal than that of the Differentiated Advantage score (DifferAdvtScore). The Cost_AdvtScores have a range of 14 and SD=3.427. This curve suggests that for the respondents, the benefits of cost advantage vary less than the benefits of differentiated advantages. One of the reasons for this could be that this is a direct business benefit, one which has the potential to improve profitability over the short run. Hence, it is suggested that green practices which lead to such advantage are more likely to be diffused in SMEs. This would explain the lesser variation and spread in this curve.

On the other hand, the DifferAdvtScore has a larger range (18) and higher standard deviation (SD=4.5). The curve is skewed to the left, which indicates that lesser companies have seen benefits of differentiation through green practices. This can be explained by the argument that green practices leading to differentiation benefits may not always result in cost savings, in fact, could be more expensive in the short-run. These investments take time to show up results – new customers, export opportunities, improved image, better talent, all have a rather long run impact on businesses.

To test if there is a difference between these mean scores between the three levels of green performance, the Kruskal-Wallis non-parametric ANOVA was conducted on the variables Level of Green Performance and Cost Advantage Score. The test showed no significant difference in the means of the two variables ($\chi^2 = 3.566$, $p=0.168$).

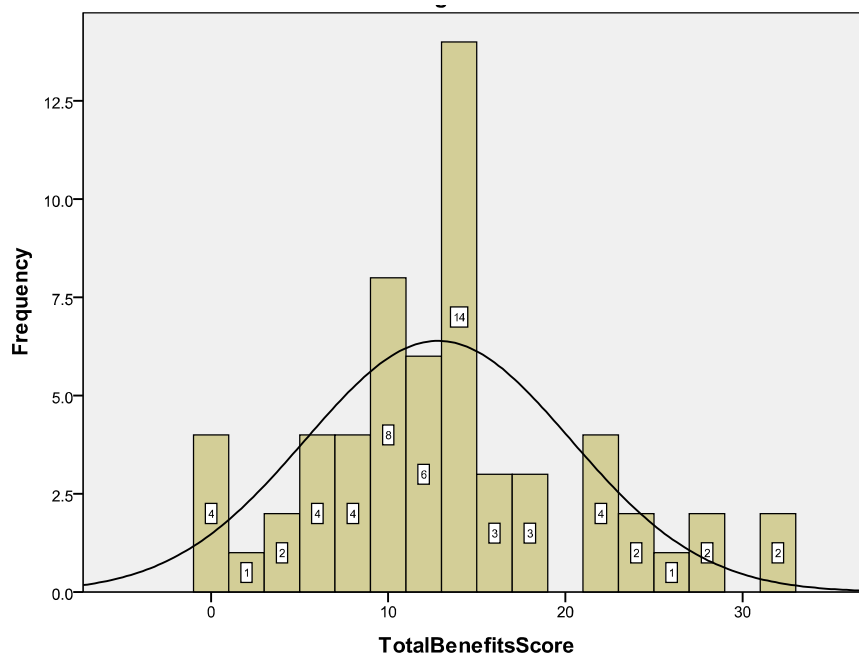
Similarly, the Kruskal-Wallis non-parametric ANOVA was run on Level of Green performance and the Differentiated Advantage Score. Here too, the test showed no significant difference in the means of the two variables ($\chi^2 = 0.365$, $p=0.833$).

Both these results are surprising intuitively, since, one would expect a company at a low level of green performance would experience lesser benefits than the company at a higher performance level. The only possible explanation, the researcher suggests, is that the data are lacking in power. The three levels of green performance have 12, 23 and 25 companies for high, mid and low level performance respectively. Power, which is

statistically represented by $1-\beta$, is defined as the probability of rejecting a false hypothesis. This is because of the statistically insignificant samples in the three levels.

Taking this test further, both the scores were added and summed into the total benefits that the company observed as a result of its green practices. This was termed as the TotalBenefitsScore and again the Kruskal-Wallis test was conducted on this score and Levels of Green performance.

Figure 28: Histogram of number of Respondent companies and TotalBenefitsScore



This test too showed that there is no significant difference between the mean of TotalBenefits between the three levels of green performance ($\chi^2 = 1.950$, $p=0.377$). This curious finding needs further sample data to conclude.

5.25 Testing Hypothesis 4: Can a high level of environmental performance be an advantage with customers?

The fourth hypothesis proposed in this research is ‘A high level of environmental performance can gain the company an advantage with its customers’. As discussed

earlier, this was supported by some responses in the exploratory study, where respondents say benefits from green performance levels.

In the section on benefits, three questions ask the respondent about benefits from green practices, observed with customers, wither new, existing or export. The responses were computed into a Customer Benefits Score (Cust_Ben_Score). The hypothesis can be tested by checking if the mean scores of Cust_Benefits, across the three Levels of Green Performance are significantly different. The mean and median scores are reported in the table below.

Table 27: Cross-tab Level of Green Performance and Cust_Benefits Score

Level of Green Performance	Customer Benefits Score	
	Mean	Median
High Level	3.33	3
Mid Level	2.78	3
Low Level	2.8	2

(Cust_Ben_Score is not normally distributed) The hypothesis H4 is tested by conducting the Kruskal-Wallis non-parametric ANOVA on Level of Green Performance and Customer Benefits Score. The results of the test are shown below.

Table 28: ANOVA – Benefits with Customers and Level of Green Performance

Level of Green Performance		N	Mean Rank
Benefits seen with customers	High	12	32.46
	Mid	23	30.33
	Low	25	29.72
	Total	60	

Test Statistics ^{a,b}	Benefits seen with customers
Chi-square	.210
df	2
Asymp. Sig.	.901

a. Kruskal Wallis Test

b. Grouping Variable: Level of Green Performance

The hypothesis H4 is rejected. The test shows that there is no significant difference between the means of Customer Benefits score, within the three groups of Levels of Green Performance.

To explain this, the researcher suggests that communication is required with customers. Companies may be at a high level of green performance but do not communicate their efforts with clients, are unlikely to observe customer benefits. On this basis, the two variables – communications score and Customer Benefits Score were tested for a correlation. Since both these variables were not normally distributed, the Spearman's coefficient of correlation was used for this test. The results showed that the two variables were not correlated ($\rho=0.269$), rejecting the explanation suggested.

The hypothesis argued that a high level of environmental performance can lead to a competitive advantage with customers, but this would work only if the customers recognized the added value and are ready to accept this differentiation for their own business. This argument finds support in previous research by Simpson et al (2004). This could then be attributed to a low environmental awareness lying with customers, due to which they do not offer preferential treatment to greener SMEs. This needs to be checked and would require data collection and a separate research.

5.26 Testing Hypothesis 5: Does a more spread of green practices within the product life cycle result in more benefits?

The fifth hypothesis H5 offered in this research is '*The extent of coverage of green practices within the product life cycle is positively correlated to the green benefits.*' This hypothesis is based on prior research which suggests that 'end-of-pipe' approach is expensive while a more proactive approach starts with product design. Thus, control is more expensive than prevention and has the potential of economic benefits.

The earlier section discussed the findings of spread of activities in the product life cycle within the respondents. As seen, 61.6% companies have green activities in 5 to 7 stages of the product life cycle while just 5% have them across 8 and another 5% have across 8

stages. Hypothesis H5 proposes that those companies with green activities in more stages will stand to gain more benefits. To test this hypothesis, a Spearman coefficient of correlation was calculated for the two variables – No. of stages in Product life cycle and the Total Benefits Score. The

Table 29: Cross-tab No. Of stages in Product life cycle and Total Benefits

		No. of stages covered in the Product life cycle
Total Benefits	Spearman ρ	0.239
	Sig (2-tailed)	0.066

This test failed to indicate any correlation between the two variables. This indicates that the benefits depend not on the coverage of stages by green activities, but on the impacts of these activities.

5.27 Influencers of environmental improvement behavior in SMEs

As shown in the conceptual framework, the researcher considers it important to identify those factors which can influence improved performance within SMEs. If these are identified, then they can be strengthened, improved or extended to other geographies or SMEs. Ten influencers were listed out in the questionnaire and respondents were asked to rate them on a 4 point Likert scale – strongly influenced, somewhat influenced, may have influenced and no influence. The influencers were classified into internal factors and external factors. The table below shows this classification.

Table 30: Classifying Influencers into Internal and External

Influencer	Internal / external
Regulatory bodies (PCBs)	External
Customers	External
Society/community	External
JV partners	External
Bankers	External

Insurers	External
Investors	External
Employees	Internal
Personal awareness	Internal

The responses of the questionnaire are shown in the graph below.

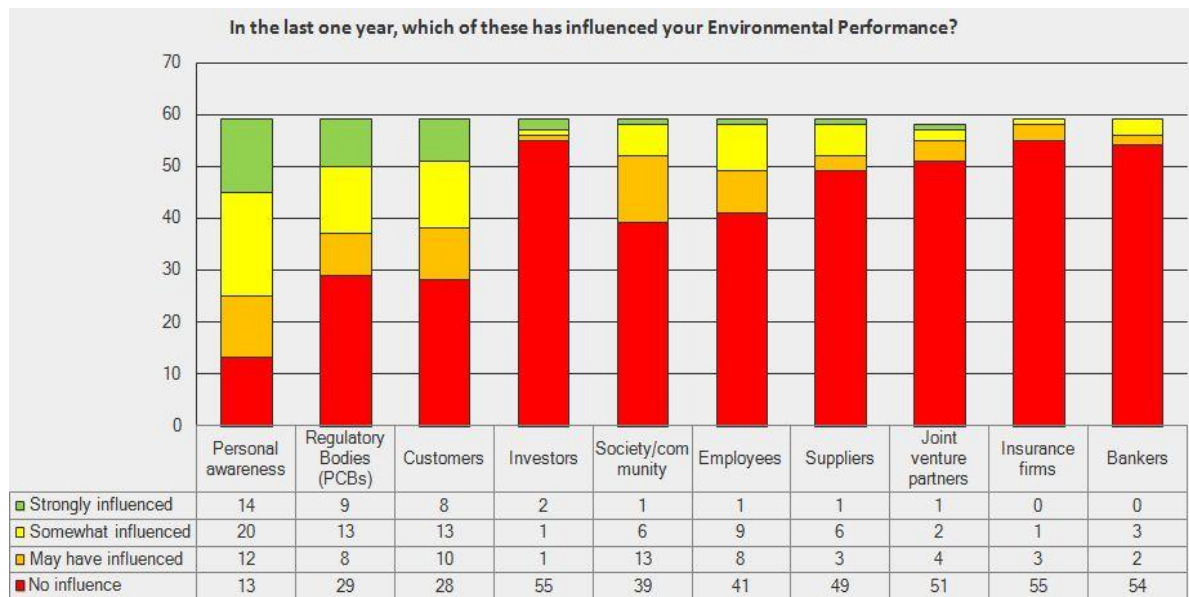


Figure 29: Responses to question on Influencers to Green Behavior

The biggest influencer clearly comes out as ‘personal awareness’ which is an internal influencer. This gets 14 responses of ‘strongly influenced’ and 20 of ‘somewhat influenced’. The closest second is PCBs with 9 and 13 respectively. Customers come third. The other external influencers – investors, society, suppliers, insurers and bankers have a comparatively lesser influence on the company’s green practices. In the earlier section, the research hypothesis H1 was accepted. This hypothesis proposes that an SME’s environmental performance is dependent on the awareness of the owner towards the industry environment relation. The finding in this section also supports the hypothesis.

5.28 Testing Hypothesis 6: A facilitative atmosphere for SMEs

Hypothesis six of this research is proposed after studying green performance in SMEs in other countries. The hypothesis stated (H6) – ‘Various stakeholders have a role in creating facilitative atmosphere for SMEs to improve environmental performance.’

In the present business scenario, besides legislation and a weak enforcement, there are not many factors which can promote improved green performance in Indian SMEs. Findings of this research show low level of awareness, no support from bankers or insurers, hardly any other incentives except those given away by benevolent customers. In such a situation, SMEs can hardly be expected to focus their attention, efforts and finances on environmental improvement. After studying research papers from various other countries, the questionnaire sought respondents views on what could be a better situation – one that would promote green performance. Respondent were given eight statements and were asked to rate the answer on a 4 point Likert scale of ‘Strongly agree, Somewhat agree, Do not agree and Can’t say’. The views were sought on awareness, barriers and influencers. The results are displayed in the chart below.

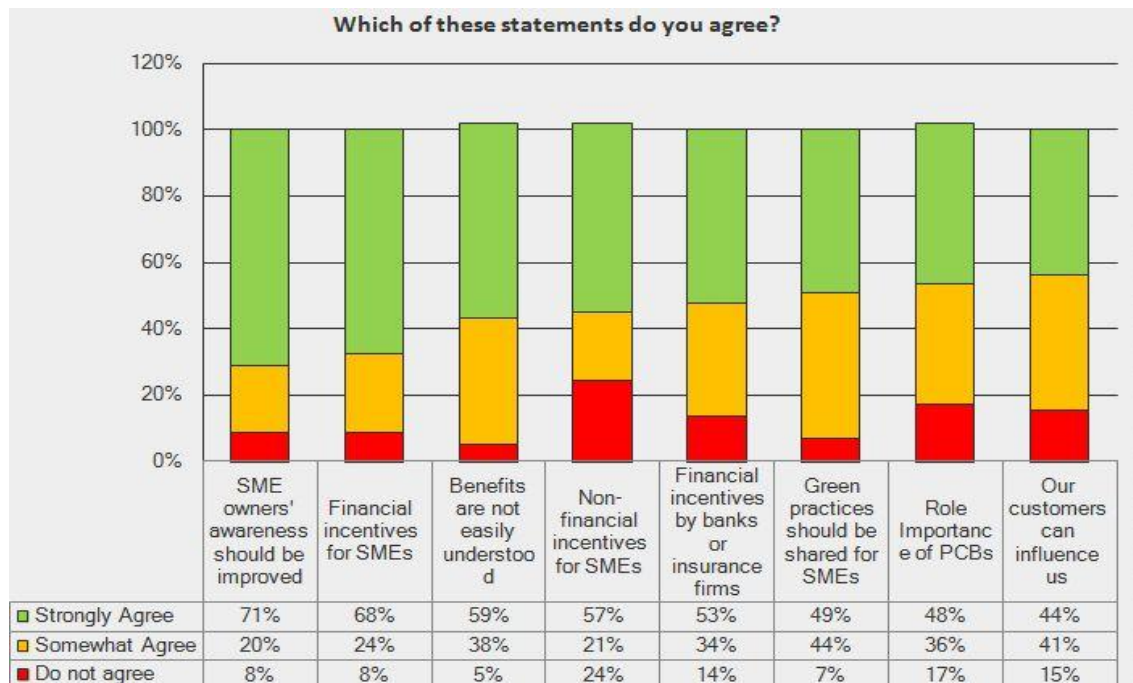


Figure 30: Responses to question on Facilitative atmosphere for SMEs

The findings of this section too point to awareness. The most ‘*strongly agree*’ responses were for the statement that SME owner’s awareness should be improved. This was closely followed by financial incentives for SMEs. This statement was on financial incentives in a manner of cash refund, like the one declared for SMEs when ISO 9000 practices were being promoted by the government. Another important finding is the acceptance by 56 companies that the benefits of green practices are not easily understood by SMEs. In fact when the researcher completed the questionnaire, several respondents said that they got to know many things from this questionnaire! Some also wanted the researcher to share the results. Role importance of the PCBs was placed second last, which is perhaps explained by the present perception of SMEs towards PCBs. 29 companies strongly and 26 companies somewhat agreed that green practices should be shared within SMEs. This is also an acknowledgement of importance to policy makers.

5.29 Testing Hypothesis 7: Are green practices considered an added cost by SMEs?

The seventh hypothesis H7 proposed in this research is ‘*SMEs perceive green practices as an added cost negatively affecting competitiveness.*’ As SMEs work under multiple constraints and limited managerial support, they continuously try to lower costs to be more competitive. Some responses in the exploratory studies showed that companies see compliance as adding costs which customers are unwilling to pay for and which many competitors do not incur. Mr. Rajesh Kulkarni, MD of Keetronics said

“Most of our keyboard competitors are small screen-printers who have very little technical capabilities and almost no compliance pressures. They do not incur the costs of solvent emission control and waste disposal, while we spend on this. Many customers are not willing to pay more for our products just because we do this.”

Mr. Bhate, MD IEAP said

“We are quite sure that our competitors do not comply with the mercury storage, use and disposal norms because many PCB officials themselves are unaware of them. Even in a place like Pune, we had to

tell the PCB what needs to be done for safe disposal. We incur these costs while our competitors do not even know of them!”

Mr. Nitin Kibe, MD Atul Electro Formers Ltd. said

“Our customers tell us bluntly – environmental compliance is your problem, we have nothing to do with that, don’t charge us extra for that! Since we are in the Red List of the PCB, we have to spend time and efforts on compliance. Some of our competitors in smaller MIDCs in remote areas do nothing for compliance. Obviously then, they produce at lower costs than we do.”

Due to such responses this hypothesis is proposed. Section 18 of the questionnaire asks the respondent to rate various statements on a four point Likert scale. These responses are shown in the graph below.

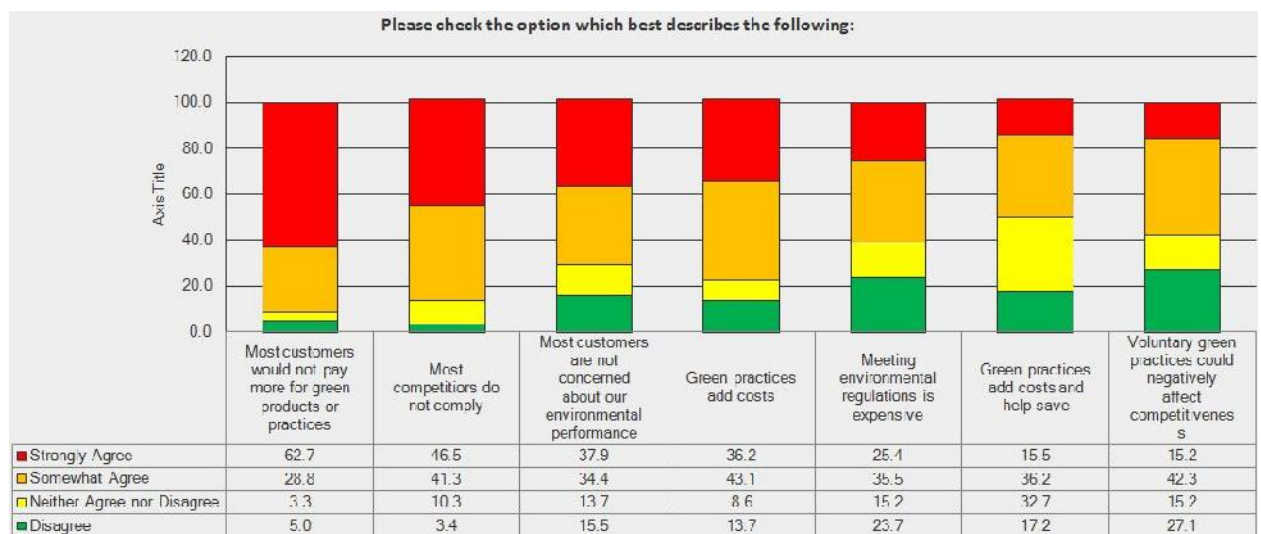


Figure 31: Responses to question on Perceptions of Green Practices for companies

36.2% respondents strongly felt that Green practices add costs, while only 15.5% felt they add costs and also help save. This is a little less than half. This accepts the hypothesis that SMEs consider green practices to add costs. Further, 46.5% felt that their competitors do not comply. This lends credibility to their argument that compliance is an added cost.

The last statement sums up this section. Over 57% agreed (15.2% strongly and 42.3% somewhat) that voluntary green practices (beyond compliance) would negatively affect the company's competitiveness. This finding uncovers the biggest barrier towards green practices in SMEs – the feeling that they add costs which customers are unwilling to pay for and competitors do not incur.

5.30 Perception of the Pollution control boards and the regulatory framework

In the open ended questions, several respondents felt that the pollution control board (PCB) was not facilitative to SMEs, were not well informed about the regulations themselves and generally were not competent for their jobs. This finds support in the Report published by the Planning Commission (Godrej & Marshall, 2012). This report suggests that the PCBs in India “....*may be financially strained and understaffed...*”

As seen in the pie-chart, 61% respondents said that Indian environmental regulations were below international standards while only 19% felt that they were comparable with advanced countries. This seems to be a general feeling rather than a studied comment, since several respondents said they did not have the latest standards for their own industry. This seems to be an attitudinal issue with the SMEs, as was reflected in the responses of another question which asked whose role they considered had the major role.

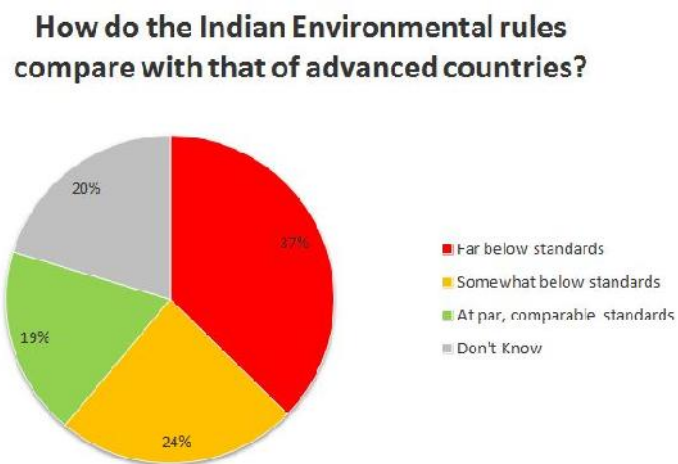


Figure 32: Responses to question on Perceptions of Indian Environmental Standards

One respondent had an interesting comment. The MD of Atul Electro Formers Ltd. Mr. Nitin Kibe said

“The PCB officials have very low awareness of the rules and regulations, and even weaker awareness of what causes environmental degradation. They need to get some training for this purpose!”

Similar sentiments were voiced by Mr. Madhav Bhate, MD. Of Industrial Electronic Products Limited, manufacturer of blood pressure monitors. He also said

“Most developed countries have banned the use of mercury in the blood pressure monitors. In India, when we went to check this at the PCB, no one knew this. In fact there was a very low knowledge about mercury and its effects.”

This suggests the need for training and developing human resources within the regulatory framework. If India needs to demonstrate environmental improvements, the government must start with human resources within its own control.

5.31 Companies and their Scores in various constructs

Table 31: Name of the company and its Scores

No	Name of Company	Green Score	Level of Green performance	Awareness Score	Level of Awareness	Attitude Score	Attitude Class
1	Genie Auto Products Pvt. Ltd.	15	3	10	2	6	3
2	Visionmax Industries Pvt. Ltd	18	2	5	3		
3	FineArc Systems	26	2	15	1	9	2
4	Ajit Enterprises	13	3	12	2	8	2
5	Bhushan Engineers	14	3	10	2	11	2
6	A Square Technosolutions	26	2	14	1	3	3
7	Ankur packaging	29	2	10	2		
8	Shri Sai Siddhi Industries	15	3	13	2	1	3

9	R S Enterprises	18	2	12	2	11	2
10	Kalpana glass fibre pvt ltd	37	1	12	2	3	3
11	Om Engineers	23	2	7	3	7	2
12	Healthmark Pharma	14	3	9	2	2	3
13	Nikhil Equipments P.Ltd.	2	3	11	2	6	3
14	Ronch Polymers Pvt. Ltd.	30	1	14	1	7	2
15	Anil Plastics and Enterprises	-3	3	4	3	7	2
16	A S industries	16	3	12	2	3	3
17	AnupPolychem Industries	27	2	9	2	-2	3
18	Stokvis Prostick Tapes Pvt. Lt	35	1	12	2		
19	Ingenesys Engineering & Consu	41	1	17	1	20	1
20	Arihant Polymoulds and Polymer	9	3	12	2		
21	Lensel Optics Pvt. Ltd.	15	3	9	2		
22	Dinesh Industries	19	2	15	1	14	1
23	Hegde Precision Engg Works	7	3	9	2	7	2
24	Lotus Tapes (I) Pvt.Ltd.	19	2	11	2	4	3
26	Versa Controls	24	2	9	2	14	1
27	Animesh Packaging Industries	26	2	3	3	2	3
28	Phoenix polymer industries	15	3	7	3		
29	Adept Fluidyne (P) Ltd.	17	2	12	2	5	3
30	Abicor Binzel Production (Indi	31	1	10	2	8	2
31	ShreeRenukar Indl Corp	33	1	10	2		
32	Aagami Lighting Technologies	42	1	19	1	7	2
33	Rapid Machining Tech Pvt.Ltd.	29	2	17	1	13	1
34	X Trans Enterprises	10	3	0	3		
35	Amasht Paper Hygiene Products	28	2	13	2	10	2
36	v m engg co .pvt ltd	-8	3	5	3	12	1
37	Sinewave Engg Pvt.Ltd.	14	3	8	2	6	3

38	Hydrolinks	-3	3	3	3	5	3
39	Rishi Engineering Company Pvt	26	2	9	2	3	3
40	Kirloskar Integrated Technolog	36	1	15	1	15	1
41	Samarth Industries	9	3	5	3	12	1
42	Gear Control	-2	3	5	3	3	3
43	Mutual Industries Ltd	46	1	15	1	5	3
44	ATE Welding Engg Roboti	18	2	8	2	12	1
45	Water wings Equipment Pvt.Ltd.	19	2	15	1	12	1
46	Intel us Electronics Pvt.Ltd.	37	1	14	1	9	2
47	Shriranga Industries	5	3	8	2	9	2
48	Sakar Udyog	1	3	7	3	6	3
49	United Industries	20	2	9	2	10	2
50	Nand Composites Pvt.Ltd.	1	3	3	3	11	2
51	Solar Biotronic Laboratories	30	1	15	1	2	3
52	Transcoil	30	1	4	3	13	1
53	Sanlan Controls	9	3	7	3	11	2
54	Atul Electro Formers Ltd.	28	2	5	3	5	3
55	Filteron India pvt.ltd.	22	2	12	2	10	2
56	Keetronics (India) Pvt.Ltd.	17	2	9	2	2	3
57	Siddha Laxmi Engineering Pvt L	3	3	11	2	6	3
58	Deval Untesils Factory	11	3	11	2	7	2
59	Deval Electroplaters	29	2	10	2	8	2
60	Industrial Electronic & Allied	-2	3	2	3	12	1

Chapter 6

Conclusions

Chapter 6 - Conclusions

Over the course of the exploratory and primary research data was gathered from over 75 companies in the form of interviews, questionnaire responses and field visits. Experts in this field and officials from the Confederation of Indian Industries were also interviewed. Both qualitative and quantitative analysis was conducted and statistical tests were employed on the primary data. Significant insights were gained in the process. While the researchers acknowledge the limitations of this research (section on '*Limitations*'), it is worthwhile to understand some of the business issues and challenges which SMEs face in the course of environmental performance. In this section the conclusions from this study are presented.

6.1 Conclusions and discussions on the central problem of this research

The central problem of this research is to establish whether improving the green performance of a company would help it gain a competitive advantage in business. To determine this, the conceptual framework was prepared before the research, which proposed several constructs and their relationships with each other, similarly, various hypotheses were made. The conceptual framework and the hypotheses were tested through statistical analysis of the primary data. This conclusion and discussion is based on these various analyses.

Competitive advantages can be gained from green business practices.

As discussed in the earlier chapter, real competitive advantage implies that companies are able to satisfy customer needs more effectively than their competitors. This can be achieved through lower costs or differentiated advantages which customer's value and are willing to pay for. Both these situations were evident in this research. The Cost Advantage Score and the Differentiated Advantage Score of the respondent companies demonstrate the benefits accrued from green practices. Thus, the traditionally accepted outcomes of business strategy are cost leadership and differentiation. Both these outcomes are possible from green strategies, as was seen from the responses in this research. Responses showed the presence of both forms of benefits. These benefits were a result of green practices and could not have been achieved by any other means.

- a) Exploratory research showed 3 respondents gaining or acknowledging the competitive advantage from greener performance. The MD of IEAP, which makes mercury-free blood pressure instruments, despite they not being banned in India, said that clients in India demanded mercury free products and IEAP had a distinct advantage in every tender. The MD of Filteron rued that they lost a good business opportunity. A potential joint venture with a Swedish company did not materialize since Filteron did not have any environmental management system in place. The MD of Keetronics felt that their company has German and US clients only because of their unique green differentiation. Godrej and Boyce who manufactured 'green' durables like ACs and refrigerators said that LG and Samsung (their fiercest competitors) can claim anything else but green products. Godrej feels that green will be the big differentiator in the coming years, a trend seen in many reports of international consulting companies.
- b) Primary data too showed respondents gained benefits from their green performance. The benefits are classified into those offering cost advantage and those offering differentiation advantage. Those SMEs who have innovated on green practices have seen unique combinations of benefits – cost advantages and differentiation advantages. Such advantages are gained as a result of an innovative and resourceful organization and are difficult to observe by competitors. The collective learning of the organization is hard to observe and imitate, effectively turning it into a competitive advantage.
- c) The benefits of lower costs are most common observation. These are a result of reduced usage of resources, lower waste, increased recycled content and lower environmental risks. These savings also result in lowering environmental impacts of businesses. Most of these benefits are realized in the short-run and are easiest to undertake, without much disruption in daily operations. Since this is important for SMEs, the research showed cost saving benefits to be the most common within SMEs. These benefits can be observed through green activities within the manufacturing stage of a company. This was supported by this research - 59 companies practiced some green activities in their manufacturing.
- d) However, lower cost is not a sustainable differentiator – competitors can observe what a company does and can imitate that. Hence there is limited scope for a

competitive advantage from low costs. On the other hand, differentiated products or a differentiated company image can be harder to imitate and is sought after through competitive strategy. However, the benefits of differentiation from green practices, were less evident in this research, than those of cost saving. At the current levels of green performance, cost benefits seem to be more than differentiation benefits.

- e) The researcher feels that this could be because of lower awareness in Indian customers about industry-environment relationship. There are fewer instances of Indian enterprises having environmental vision and targets like MNCs. Indian media is not as vigilant as in some developed economies. In combination, these factors could inhibit b2b customers from seeking green performance improvement from their suppliers. Therefore while these customers seek continuous quality improvement in vendors, they are unlikely to demand this in environmental performance. When this gains favor, SMEs will certainly invest in green innovation for differentiation. Presently, there are customers who require and value green performance from their vendors but presently, this is a small segment which will grow in the coming years. As global practices spread quickly within the industry, Indian customers too will demand environmental performance from their vendors. The world is fast approaching towards global standards. It is important that large customers (to whom SMEs generally serve) be encouraged to set environmental performance targets themselves. They have the wherewithal to focus and innovate as well as bring up SMEs to their standards. Many large corporations that the researcher interviews in the exploratory stage did demonstrate a preference for green performance. Cummins India sets environmental criteria for their vendors, Godrej Industries requires environmental reporting from some of its key vendors and Kirloskar Brothers are planning for greening their supply chain. The impending arrival of Wal-mart to India will not be a huge opportunity for vendors who do not incorporate green practices within the product life cycle. For those that do, they stand to gain a competitive advantage straight away. Wal-mart has, over the last decade, meticulously tried to don a 'green' avatar and they make sure their vendors do so too.
- f) Some respondents also gained new customers and some improved their relations with present clients. 10 companies gained export opportunities as a result of their

environmental performance. This is significant and shows that international customers are favoring vendors who manage their environmental performance, and this can be expected with Indian clients too.

- g) The benefit of lower environmental risk is perhaps the least understood. While in developed economies companies would invest in compliance and in some cases beyond compliance, only to lower potential environmental threats; this was not seen in this research. This is dependent on the awareness of owners, a factor which has shown a highly significant correlation to the level of green performance in a company. In Indian business scenario, there may be two types of situations (i) where environmental risks are not perceived at all and (ii) where environmental risks are not considered significant. Both situations will do little to motivate the SME owner to mitigate the risk. The first situation arises out of ignorance while the second situation finds statistics to be handy. When the probability of an environmental risk blowing up is very low, there may never be an example in the market to worry decision makers. This prompts an attitude of *'won't happen with us'*. Another important factor in mitigation of environmental risks is that any investment towards mitigation is difficult to realize in a ROI. How do you ascertain if the investment has paid off if the threat does not materialize? This would perhaps be a barrier towards mitigating risks.
- h) Another important competitive advantage which greener SMEs stand to gain is that of being the first mover in the field. SMEs which raise the bar for environmental performance will be preferred in the small but growing segment of green customers. If they get in now with contractual relationships, it will be tougher for others to do so, when this practice diffuses in their industry. A similar situation happened in India when ISO 9000 practices were not widespread within SMEs. Those few SMEs who did indeed get this certification, were able to get into large clients while some gained new export business. The companies which followed suit later had a tougher job to break in the existing vendor relationship.
- i) Finally, companies which produce products in a cleaner environment are likely to set benchmarks for future regulations. They will be the biggest gainers of this regulation and stand to gain a position of environmental stewardship.

- j) Impact of green practices on Brand Value of the company. Many previous studies show that the brand value of the company stands to benefit through a greener image. This author did not consider this in the present research. However, this is interesting fallout of environmental sustainability practices which is worth studying in the future.

Caveat: While this researcher proposes that the hypothesis to the central problem of the research be accepted, there is a caveat which has been revealed in this study. The customers of these SMEs have to accept the differentiated value of green practices from their vendors, as a value. If this is not acceptable to customers, then SMEs are not likely to gain the promised competitive advantage from green performance. This customer acceptance in Indian business scenario is only possible when either one or both the conditions below are satisfied:

- (i) Customers of SMEs are aware of the environmental impacts of economic activities and intend to improve their own performance
- (ii) Customers for SMEs set environmental goals for their own companies

The diversity and complexity of Indian SMEs' activities within and across different sectors affect the nature and intensity of environmental problems. Moreover, the number of SMEs and their varied organizational capabilities pose a colossal challenge, one which, this researcher is of the opinion, cannot be addressed by voluntary strategy alone. A more effective approach would be one that is pulled by a company's customers will be more effective for India, than one which is based on external supervision and compliance. Given the size of the Indian SME sector, it is almost impossible for external supervision and regulation to be an effective approach.

6.2 How we get SMEs to focus on and improve green performance? Although this research proposes that a competitive advantage is gained by green performance, this alone is not enough motivation for SMEs to improve green performance. Barriers have been identified and established, which act upon SMEs. The low awareness and indifferent attitudes of SME owner's also need to be dealt with. There are numerous reasons why SMEs do not or cannot improve their green performance.

Chapter 7

Suggestions and Recommendations

Chapter 7 – Suggestions and Recommendations

7.1 Framework for Policy-makers

The goal of this research was that it should provide a framework for SME owners and policy makers so that the Indian SME sector turns greener in the near future. During the course of this research, many SME owner respondents asked this researcher how to improve green performance. They were not quite sure of what to spend time and efforts on and whether these efforts will materialize into anything positive for the environment. Moreover, many SMEs did follow green practices in manufacturing but have not ventured further. For them, the researcher proposes a framework. Indian policy makers have long been passive law makers and enforcers. This approach must change for the benefit of the nation and its citizen. India has tried long enough with this approach and the change seen is not enough for posterity. The era of enforcement is gone. The new age must be encouraging and facilitative. Towards this goal, the policy makers have a large and important role to play. For policy makers, the researcher proposes another framework.

The recommendations are based on the Four-force Framework proposed in the conceptual framework. This frame work is shown in the figure below.

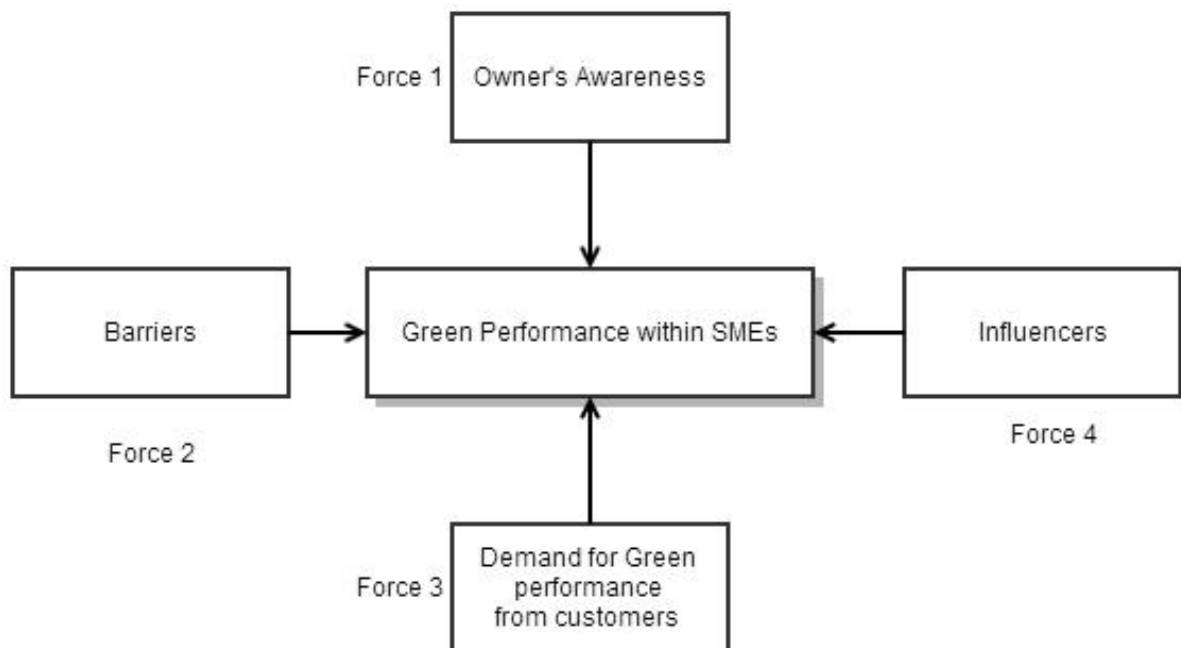


Figure 33: Four Forces acting on Green Performance of Companies

The conceptual framework proposes that an SME's green performance depends on four forces namely – awareness, barriers, influencers and customer demand. These four forces act are present in varying strengths in different industries, due to which, the resultant force can vary. Of the four forces, Force 1 can result in a proactive behavior, while the other three forces are likely to elicit a reactive behavior.

Based on this framework, the recommendations are made to improve awareness, reduce barriers, strengthen influencers, and encourage customer demand. For this, not only the SME owners will have to participate, but also various other stakeholders too. The recommendations are specifically directed to be beneficial for SME owners and policy-makers.

Force 1: Awareness - the backbone of the dilemma

Throughout the analysis, various sections of this questionnaire have more than once revealed a singular aspect, which, the researcher feels, is the backbone. The environmental performance of an SME is highly dependent on the owner's environmental awareness. This seems to be the single most critical factor in improving SME green performances. This statistical analysis shows a highly significant dependence among the two variables.

The SME owner's awareness seems to be the key to change. This is a finding of importance to policy makers, trade associations, environmentalists and chambers of commerce. Concerted efforts to improve environmental awareness among SMEs are not required. It is possible when all these stakeholders plan towards this goal.

(i) Role of government

A similar situation was successfully handled by the government some decades ago. This was about creating safety awareness in industries. The Indian industries had a high accident rate compared to other countries and this was attributed to low awareness levels. The National Safety Council of India was set up in 1966 with the vision of creating a safety and preventive culture in organizations. NSC, along with local chambers of commerce, played a vital role in spreading awareness in industries and SMEs in particular. This helped improve the safety standards over

the next decade and today, Indian industries have vastly improved safety standards. The government can consider a similar organization which is aimed only at spreading awareness in industry. This council can work with local bodies, trade associations or chambers of commerce, to spread awareness within SMEs. This council will have a 3 point mission (i) Spread awareness of industry-environment linkage (ii) Highlight the current environmental situation, need for healthy environment and what is environmental degradation (iii) Communicate with workers, managers and owners in SMEs, through posters, slogans and case studies (iv) Engage the attention of SMEs with contests, events and activities.

(ii) Role of industries

The local chambers of commerce and trade association can facilitate environmental awareness programs and training on environmental performance improvement. Within an SME cluster, these bodies have sizeable membership of local companies. For example, in Pune, the Mahratta Chamber of Commerce, Industries and Agriculture (MCCIA) is the largest chamber of commerce in Maharashtra. They have influential industrialists and politicians on their advisory boards and panels. This organization has, over the last few decades, helped local industries in several challenges – improving quality, competitiveness, knowledge of taxation, government schemes and subsidies etc. They are well suited to focus their efforts on helping create awareness among local industries as well as holding advanced environmental training programs.

(iii) Role of bankers

Many SMEs build relations with their bankers. For some small companies, the bankers lend financial advice and may even sound an alarm on potential financial threats. Bankers are often accorded a high credibility by SME owners, who acknowledge the critical role of the financier in their company's progress. This puts bankers in a unique position – one that can be leveraged to improve environmental awareness. The PCBs have not been effective in communicating environmental standards and norms. Banks can help spread awareness about compliance, since they stand to benefit from it. If their customers (loan

beneficiaries) are able to lower their risks of environmental violation, then banks in turn lower their business risks. With this motive, they can diffuse environmental awareness and help in improving SMEs performance.

Force 2: Reducing Barriers

The barriers which came up in the research are unique to SMEs and their constraints. Finance has been the biggest barrier. Even in the other section, SME owners considered this barrier important in diffusing green practices. The following recommendations are proposed to reduce this barrier

(i) Subsidize green certifications.

During the 1980s, the government subsidized ISO 9000 certifications in within SMEs. Those who received a certification could claim Rs 75000 as a partial refund of expenses. This helped SMEs finance a certification which they did not consider a business priority. The TQM movement enhanced the competitiveness of many SMEs. While this is 'private profit' as opposed to 'public good' (Orsato, 2006) of environmental practices, nevertheless, this provides a compelling argument. The rate of diffusion of environmental practices within SMEs can be accelerated by incentivization. In one section of the questionnaire, 68% respondents strongly and 24% respondents somewhat agreed that such a financial incentive would benefit SMEs.

(ii) Preferential financing of green activities.

Costs associated with green strategies are significant for SMEs. The finance and other scarce resources have to be diverted from mainstream business activities to unproductive areas. Here, three stakeholders have a role to play. Government, Bankers (money lending institutions) who can offer lower interest rates for green capital expenditure and investing in clean tech and Insurers who can offer lower insurance premia for conditions of lower environmental risks.

Direct financial assistance programs for environmental equipment purchase can promote purchasing such equipment as well as stimulate a demand for environmental technologies. This has been successfully implemented in France, where Environment and Energy Management Agency (ADEME) provides direct financial assistance to projects going beyond compliance for a investment projects in air pollution reduction, waste management, soil remediation, renewable energy, energy efficiency, and cleaner transportation. Similarly, the German public bank “Kreditanstalt für Wiederaufbau” has a “Special Fund for Energy Efficiency in SMEs²” which covers up to 80% of costs for SMEs to receive professional advice on energy efficiency improvements. The Korean Ministry of Environment provides financial support to SMEs in the priority areas of air pollution reduction and increased recycling. SMEs that voluntarily install low-NOX (Nitrogen oxide) boilers can get a 90% subsidy from the Ministry, which also operates a Resource Recycling Promotion Fund to provide grants to eligible small businesses (Mazur, 2012).

Low-interest loans are granted in several countries in the European Union. The loan policy can be used to provide both positive and negative incentives to businesses. The Development Bank of Japan uses environmental screening to evaluate the level of corporate environmental management. India has SIDBI³, a public financial institution whose objective is “*to be the principal financial institution for the promotion, financing and development of industry in the small scale sector*”. They are thus in a unique position to offer low interest loans for environmental technologies. The Energy Saving Trust⁴ a non-profit organization in the UK, provides zero-interest small business loans of up to GBP 100,000 to help businesses install renewable energy

² http://www.odyssee-indicators.org/publications/workshops/warsaw/Session-2-Industry/SME-program_Germany.pdf

³ <http://www.sidbi.in/>

⁴ <http://www.energysavingtrust.org.uk/Organisations>

technologies or measures that reduce energy consumption. The Green Deal⁵, a UK government program, provides businesses with loans for energy efficient equipment without down-payment and with payback tied to cost savings obtained over the course of its operation.

- (iii) Facilitation Centers to promote environmental awareness and green benefits. Here again awareness shows up. This time as admitted by SME owners themselves. 98% agreed that owner's awareness needs to be improved while 95% agreed that green benefits are not easily understood by them. There is highly significant agreement among respondents on both these points. To add to this, the statistical testing showed a highly significant dependence of owner's awareness and level of green performance of the companies. This further strengthens the recommendations that there must be investment in promoting industrial awareness. CII has played a seminal role in Green building standards in India. Their stewardship is widely accepted across industries which this gives them a favorable position to promote environmental awareness too. State governments can open facilitation centers specific to SME clusters. Since SMEs in a region generally learn from each other, this characteristic can help diffuse practices of one company within the cluster. These centers can facilitate sharing of best practices across industries. For example, in France, 21 Technical Industrial Centres⁶ covering 32 SME dominated industry sectors, act as facilitation centers. They work with support from different business organizations and funded through fees paid by businesses. The National Industrial Symbiosis Programme (NISP)⁷ was launched in the UK in 2005, and provides information, networking and matching service for companies. In this research, 93% respondents felt that green practices should be shared within SMEs, and this can be facilitated by the facilitation centers. A similar role was played by the National Productivity

⁵ <http://www.greendealuk.co.uk/>

⁶ www.reseau-cti.com

⁷ <http://www.nispsnetwork.com/>

Council (NPC) in increasing awareness about productivity. This can be replicated on the environmental performance improvement.

- (iv) Improve and enlighten State pollution control boards (PCBs).

The PCBs offices are understaffed and under skilled (Sahu, 2010). Increasing awareness should start with the enforcers. Improving the knowledge and awareness of its employees is the first step. Are they periodically trained for skills improvement? Are they evaluated and mentored? Are they sensitized towards the environment? These efforts would result in more credible officers visiting SMEs. The PCB should assume the role of a facilitator and shed its image of an inefficient and unaware enforcer. At the very least, there is an immediate need of simplifying regulations, making them more understandable in common language; establishing SME specific cells within the regulators to facilitate enforcement and increasing the number of staff.

The CPCB can learn a pick up some successful ideas from the US EPA. For example, the US EPA has substantial experience in measuring outcomes of environmental compliance assistance to demonstrate the effectiveness of preventing non-compliance. Direct compliance assistance is provided by the EPA through on-site visits, workshops, training programs, distribution of guidance documents and assistance provided through sector-specific, web-based Compliance Assistance Centers. Their Small Business Environmental website⁸ is sectoral, user friendly and comprehensive. It is handy for small businessmen and is the single point gateway of most SME requirements.

Force 3: Strengthening influencers

Merely reducing barriers is half the story. This research has established the role of influencers to green practices within SMEs. Each of these influencers can be strengthened with a view of promoting greener SMEs. The recommendations are:

⁸ <http://www.smallbiz-enviroweb.org/default.aspx>

(i) Personal Awareness, the biggest influencer.

In this section too, awareness comes up as the biggest influencers towards green practices. The earlier recommendations can be implemented to improve personal awareness.

(ii) Bankers and insurers as influencers.

This research shows that banks and insurance companies have had the least influence on SMEs. Finance is the single factor agreed upon across various industries and SME size. Therefore, without support of financing institutions, the movement will lack ‘teeth’.

SMEs rely on auditors, banks and insurance companies as credible sources of information. SMEs frequently interact with them and this provides an opportunity to have them influence their SME customers. These institutions can disseminate information and exert pressure on SMEs to pursue environmental improvements to achieve greater business success. Banks can ask for an environmental checklist during loan approval and insurers can ask for environmental risk identification and control plans. Banks and insurers can also offer favorable loan or insurance policy conditions to businesses with green credentials. At the international level, the United Nations Environment Program has published policy documents to promote sustainability in the banking and insurance sectors⁹. On the ground, the Royal Bank of Scotland follows the Equator Principles guidelines for assessing environmental and social risks of project finance transactions. The Irish EPA has started discussions with the Irish Insurance Federation to try to make sure that insurance companies introduce environmental requirements for their clients, although this process is at an early stage. Similarly, insurance companies in Korea are considering the differentiation of insurance premiums depending on the level of environmental risk. In Netherlands, the ABN Amro bank played a key role in influencing new project financing to have an environmental report.

⁹ http://www.unepfi.org/fileadmin/documents/guide_banking_statements.pdf

Banks, lending institutions and insurance companies can have a positive influence on undertaking green practices.

(iii) The influence of an aware and enlightened society.

Without human resources, it is inconceivable for companies to create products or services. The human resources companies employ are an integral part of the society. The same society which stands to gain from a better environment. From this position they can influence SMEs to go beyond compliance. This requires environmental education at the school and college level. As children are the future of the nation, they must be aware how a healthy environment is the key to human health and happiness. For this, they must learn how industry can improve or degrade the environment. This researcher browsed the various school text books on environmental education. None of them had any direct mention of how industries have harmed the environment till today. They talk about consumption of natural resources, and about polluting industry. The pollution created by consumption is not dealt with in depth and undermines the impact on the environment. These need to be corrected and teachers trained to teach these courses. Only then can we expect responsible citizen who have the power to influence industries into improved behavior.

(iv) Encourage companies to seek greener vendors.

Large companies have been influential on SMEs on many occasions. They have demanded quality, productivity, safety and social good. It is imperative that they now influence environmental performance in SMEs. It is possible for government to encourage large companies to do so. Here too, associations like CII and FICCI can play the lead role. They have the power to influence their members and the government, and have a history of commendable efforts which have benefitted Indian industry. This can promote emerging export opportunities for SMEs. ISO 14001 certification is now an integral part of the European Union's Eco-Management and Audit Scheme (EMAS, 2013). Such requirements will increasingly be essential for exporting to developed countries and those who are prepared can secure such opportunities. In the

European Union, there are several examples of government encouragement to diffuse green practices within the supply chain. In Ireland, a Business-to-Business (B2B) Green Mentor Programme¹⁰ was launched in 2003 by Regional Waste Management Office. This program encourages large companies to provide guidance on waste prevention to their SME vendors. In Scotland, the Zero Waste Program promotes voluntary agreements with retail companies who then pass on the resource efficiency requirements down the supply chain.

(v) Influencing green behavior through awards and recognition.

There is no dearth of awards for good business practices, quality and productivity achievements. This has to be supplemented with recognition of environmental practices. Awards and social recognition promote a competitive atmosphere and one that leads to innovation. Instituting regional, sectoral and national awards can help spread innovative and competitive practices within SMEs. Recognition offers several benefits. Business leaders have an innate desire to be recognized as the best or at least better than the competition. This is possible with awards and therefore this recommendation finds credence.

(vi) Influencing through good governance.

What Indian industry lacks today is a system of uniform and strict enforcement. Currently, there is a limited liability of environmental violation. Many researchers feel that violators are not made to bear the full costs of environmental degradation liabilities. The perception of PCBs with SME owners has to be corrected. If they do not improve their own knowledge and awareness, their credibility is at stake. If they do not do their job of enforcement effectively then SMEs will believe that their competitors may not strictly follow norms. This can prompt them to follow suit, since not doing so will increase their costs. On the other hand, a just enforcement system can

¹⁰

http://www.envirocentre.ie/includes/documents/Limerick_Clare_Kerry_Regional_Waste_Management_Office.pdf

encourage SMEs to undertake green practices without the fear of a competitor getting away and reducing expenses.

(vii) Certification as an influence.

There are numerous instances of unscrupulous companies taking advantage of green consumers. In absence of clear definitions, green labels and eco-branded products can be manipulated to the advantage of the seller. ‘*Greenwashing*’ is the term given to such incidents. One way to avoid this is that policymakers can introduce green certifications which are specific to an industry. Electroplating industry certifications will be different from security services industry. To start with, the industries on the Red List¹¹ are suggested for introducing such certifications. The certifications will have levels to help buyers to make a choice.

(viii) Influencing greener companies through public sector demand.

As a start, the governments itself can enforce green purchasing policies for its own companies. Introduction of green requirements as a condition for tendering for government contracts is feasible. The contractors can commit to maintaining specified environmental standards up and down the supply chain. Such green procurement can also increase market acceptance of green products by demonstrating their commercial feasibility. The Scottish Government’s “*Public Procurement and Sustainable Development: Guidelines for Public Purchasers*”¹² dictates that those who fail to comply with environmental legislation may be excluded from selling to the Scottish Government. This guideline explicitly mentions that companies producing environmentally preferable goods and services and use of recycled/renewable materials are likely to offer a competitive advantage. The European Commission had proposed that 50% of all public tenders be “green”, i.e. compliant with common core Green Public Procurement criteria.

¹¹ <http://gpcb.gov.in/pdf/rog.pdf>

¹² www.sustainablesotland.com

7.2 A framework for SME owners

This researcher noticed that many SME owners did have intentions of green practices, however, were not sure how to go ahead. Many, as the findings show, do practice green activities in manufacturing stage but do not know what to do next. To benefit SMEs, the researcher proposes a framework, based on the findings of the exploratory and primary research.

In the lifecycle of an SME, companies start out by aiming improvement in quality and productivity. Both these result in lower costs and improved products and benefit the company with some competitive advantage. Most often, this advantage is not sustainable because someone else does it 'better' and 'cheaper'. These practices are easy to observe and generally well known. Some practices within this stage are green already, perhaps without the knowledge of the owner. The next stage is differentiation. Companies search for the elusive differentiator, one that is valuable for customers and inimitable by competitors. This stage demands sound internal competencies and managerial capabilities. Without that, imitation is a popular strategy. As expected, advantages from imitation are short lived, unless there is innovative imitation. Not many SMEs would focus their attention to green practices until now. Depending on their awareness, some companies spot environmental improvement as a competitive opportunity early on, while most would sense it late or not at all.

This and prior research have shown that SMEs may not select environmental strategies which could result in business benefits. Owner's awareness is a constraint in the decision making since there are hardly any instances of SMEs engaging environmental consultants. Moreover, some companies do not communicate their green practices, which is unlikely to result in customer benefits. To overcome these and other findings of this research, the following framework is suggested for SMEs.

The Roadmap for a greener company

Securing a competitive advantage from green business practices requires the strategic planning process to be employed by a company. The researcher recommends that SMEs

prepare a Green Strategic Planning document for their company. This document will lay out the following elements from an environmental impact perspective: vision and objectives, life-cycle plan for present products, new products that will be introduced, new markets to be accessed, technologies that will be employed and organizational focus and commitment that it will generate. The generic strategic planning process is illustrated in Figure 2.

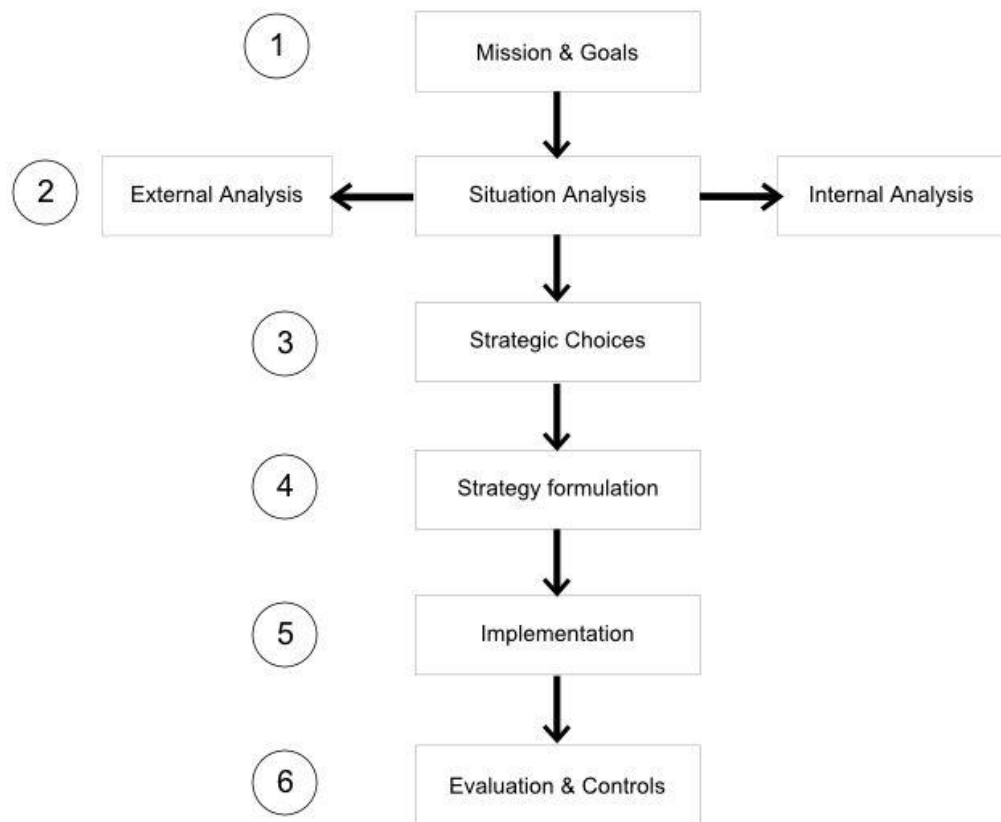


Figure 34: Generic Strategic Planning Process

Step 1: Setting Mission and Goals.

The first step towards a greener organization starts with setting goals, objectives and targets. The establishment of quantitative goals provides a clear point of reference for developing and applying metrics. Unless management and employees have a clear understanding of exactly what is expected from the process and what will be evaluated for ascertaining this, attention to environmental issues will be unfocused and motivation

will reduce over time. Making a cross functional team for target setting is recommended. The old English adage works here - “What’s measured, improves.” In this research, only 10% of the respondents had set environmental targets for their companies.

The environmental mission talks about two things – why you exist and the major goal you have set for the company. The vision shows the direction to be taken and the goal to be reached. Precise and measurable objectives are also set. A useful guide for setting objectives is the Coalition for Environmentally Responsible Economies (CERES) publication of “The Ceres Principles”¹³. This is a ten-point code of corporate environmental conduct. Similarly, the International Chamber of Commerce (ICC) has prepared the ‘Business Charter for Sustainable Development’¹⁴ which sets out 16 principles for environmental management. These documents can be used as guiding principles.

A three level target setting guide is suggested by this researcher (Table 32)

Table 32: A Level approach to setting Green Targets for SMEs

Level	Basis	Business benefit	What to measure
First	Compliance and Control	Reduced costs	Pollutants, emissions, energy
Second	Prevention and Reduction	Reduced costs, ‘doing good’	Materials use, direct energy, indirect energy, water, non-product output,
Third	Design for environment	Differentiated image, doing good to the environment	Life cycle assessment,

After setting the targets, a team should be formed. This team will comprise personnel across departments and specializations. The team will be empowered to facilitate achieving targets. Their first task is to communicate the targets, efforts and benefits expected, across the organization. To reach the organizational goals, they will identify tools and technologies, disseminate best practices and measure the progress. This is an

¹³ http://www.iisd.org/business/tools/principles_ceres.aspx

¹⁴ <http://www.iccwbo.org/Advocacy-Codes-and-Rules/Areas-of-work/Environment-and-Energy/Business-Charter-for-Sustainable-Development/>

add-on duty for existing employees and this researcher recommends remunerating the efforts. The mission, goals and objectives should be communicated to the organization.

Step 2: Situation analysis.

Three tools are suggested for external analysis – Stakeholder analysis: Stakeholder analysis consists of an analysis of the company's customers, community, investors and risk assessors, regulators and watchdogs, employees, business partners and competitors (Esty & Winston, 2009). This should capture the changes on the horizon and the potential risks that the company is exposed to from each of the stakeholders. The analysis should address the four parameters: What is the power and influence of this stakeholder in my business? What is my focus on him now? How would they react to our green behavior? What is the risk of not meeting their expectations?

PESTLE: This is a tool for assessing the macro-environmental factors. The acronym stands for Political, Economic, Sociocultural, Technological, Legal and Environmental factors. It is evident that the factors analyzed in this tool cannot be influenced by the company. Thus these will be the constraints that the strategic planning process must operate within.

Internal analysis looks at the company's own strengths and weaknesses. Strengths and weakness should be looked at from four perspectives: Product, Processes, Management, Research & development.

Step 3: Strategic Choices

Porter suggested three generic strategy choices – cost leadership, differentiation or focus. A company can choose one strategic position based on value to the company's core customers and also the industry structure. Based on the external and internal analysis, a strategic position should be chosen for the company. Thus, a company can choose one of the following.

- Lower its cost compared to competitors through environmental improvement practices
- Differentiate on environmental objectives and performance

The first strategic position – lowering costs – is where most SMEs are good at. This also makes it the weaker position in terms of duplication. The second position has to start with identifying customers that the company wishes to serve and understanding the value proposition that the company can offer based on green differentiation. Without a large or growing customer segment, this position can be a hard choice. It is also important to get the communication strategy right. To maintain this differentiated position the company must protect imitation. Often, an early mover gains an edge over followers.

Step 4: Strategy formulation

To understand how the strategies need to be formulated the generic competitive environmental framework suggested by Orsato (2006) is useful for SMEs. This is a cross tabulation of the two generic strategic positions with Internal processes or products could result in four strategies.

On the basis of the finding from this research, the researcher recommends a starting point for SMEs as quadrant 1, Eco-efficiency. This will help them manage their priorities and focus on the desired change – lowering process costs innovatively. There are various avenues for SMEs to improve organizational processes. They could hire the services of environment consulting companies or EMS implementation companies, they can pursue

ISO 14001 and also achieve desired results or it could be addressed internally too. The competitive advantage here is when a company can create a system of continuous improvement in this area, helping stay ahead of competition. This will focus on innovation which should drive costs lower.

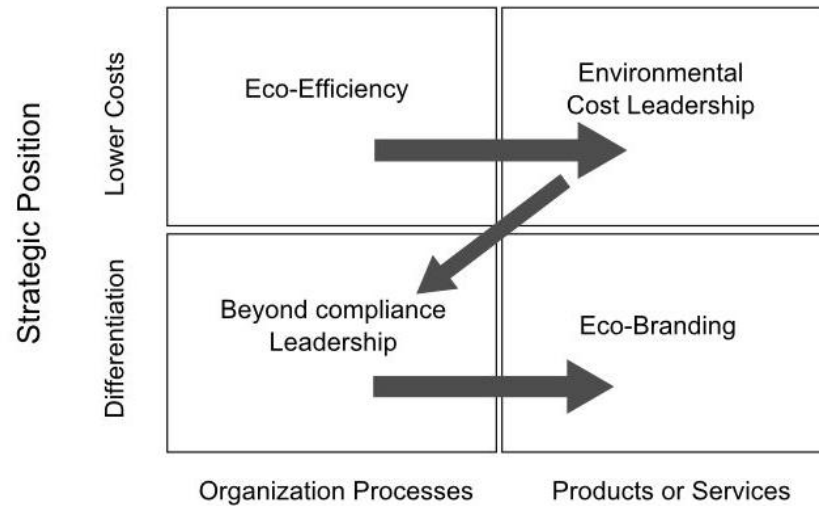


Figure 35: Generic Green Strategies for SMES

Redacted from Orsato (2006)

In the next step, companies can address Environmental cost leadership as the strategy. This will help get in their knowledge and experience in the earlier step into their products or services. In this strategic approach, companies shall design new products for the environment, besides modifying present products. This approach also requires companies to relook at their customer segments.

The last two stages of differentiation through organizational process and beyond compliance leadership and Eco branding are the more difficult strategies for small companies. This requires not only innovative approaches towards processes and products, but also a redesign in the company's product life cycle.

Step 5: Implementation

This step can make or break good strategies. If the strategic imperatives are not followed or selectively followed, then the risk of not achieving the desired position is high. An

SME with scarce human resources can create a strategy team for this purpose. This team should:

- i. Be trained in the strategic planning and implementation process.
- ii. Should be empowered to make changes, set things right or take strategic decisions.
- iii. Be incentivized for milestones and results.
- iv. Prepare a plan and schedule of the plan and manage the process
- v. Identify key metrics before, during and after the plan period
- vi. They must meet periodically and show the results of the previous periods
- vii. Besides this, the top leadership should display a commitment to the strategic focus.
- viii. Celebrations of achieving milestones are a good motivator as reported by Keetronics, a respondent of this research.

Step 6: Evaluation and control

Regular evaluation should be part of the strategy team. Once during the year, an independent audit can be conducted.

7.3 Further considerations for a sustainable enterprise

a. Identifying and implementing Cleantech

The two approaches for an improved environment are (i) End-of-pipe solutions to reduce the impact of emissions, waste and pollution. This has been the traditional approach and one that is based on control and driven by regulation (ii) Clean technologies, which prevent pollution, reduce waste and emissions. This aims at going beyond compliance. From the SME perspective, investing in clean technologies would require considering them during the product design stage, since shifting from existing technologies to clean technologies could be a financial burden which may not have short-run results. Although cleantech is defined variously by different bodies and researchers, generally this includes a diverse range of products, services and processes clean energy, green chemistry, recycling water and waste all of which are

aimed at a smaller environmental footprint. UNEP¹⁵ and OECD¹⁶ have predicted growth in cleantech and have been promoting awareness and education about it.

b. Life cycle assessment – the tool for environment

Life-cycle assessment (LCA) is also termed as life-cycle analysis is a technique to assess the environmental impacts of a product's life from the design stage to its discarding (cradle-to-grave). This includes all the stages from raw material extraction, materials processing, energy use, carbon generation, water use, natural resources consumed, manufacture, distribution, use, repair and maintenance, and disposal or recycling. A complete LCA would include three separate components: an inventory analysis, impact analysis and improvement analysis. The US EPA promotes the use of LCA in US industries through awareness and education¹⁷. The LCA is ideally carried out before the product design stage and the best alternative is the one which LCA shows up to have the least cradle-to-grave environmental negative impact on natural resources. Implementing LCA is not an easy task, particularly for SMEs. The amount of data involved, high costs and a lack of know-how can be challenging for SMEs. To help in diffusing the LCA, several bodies have been actively working in the European Union specifically for SMEs. The LCA2Go¹⁸ is one such group which promotes the use of LCA tools for SMEs in Europe. They have developed a software application¹⁹ which helps SMEs conduct an LCA.

c. Global Reporting Initiatives – Sustainability Reporting

The Global Reporting Initiative (GRI) is a non-profit organization promoting economic sustainability in industry. It produces one of the world's most prevalent standards for sustainability reporting. GRI aims to make sustainability reporting by all organizations as routine as, and comparable to, financial reporting. A sustainability report is an organizational report that gives information about economic,

¹⁵ http://www.unep.org/publications/contents/pub_details_search.asp?ID=4164

¹⁶ <http://www.oecd.org/cfe/leed/48744753.pdf>

¹⁷ <http://www.epa.gov/nrmrl/std/lca/lca.html>

¹⁸ <http://www.lca2go.eu/>

¹⁹ <http://www.lca2go.eu/files/LCA2go-brochure.pdf>

environmental, social and governance performance. A sustainability report is about the economic, environmental and social impacts caused by a company's everyday activities. A sustainability report also presents the organization's values and governance model, and demonstrates the link between its strategy and its commitment to a sustainable global economy. This report can help organizations to measure, understand and communicate their economic, environmental, social and governance performance. Sustainability reporting is therefore a vital resource for managing change towards a sustainable global economy – one that combines long term profitability with ethical behavior, social justice and environmental care. Several reports by GRI²⁰ themselves and others are published which show the business benefits²¹ from GRI reporting for SMEs.

d. Networks for SMEs

International Network for Environmental Management (INEM) is the world federation of non-profit environmental management associations and cleaner production centres. Their network has over 30 member and affiliated environmental management associations

and 10 cleaner production centres in more than 25 countries worldwide. The main goal is to minimize the environmental impacts of industrial operations, and to help business and industry reconcile the imperatives of development and the environment. www.inem.org

European Environment Agency (EEA) Sustainable Development Online (SDO) – This gives access to significant sustainable development sites. It provides descriptions of, and links to, many hundreds of sites covering the broad subject of sustainable development, including networks and tools for business. <http://sd-online.ewindows.eu.org>

The Environmental Management Navigator – This is a capacity building package on environmental management tools. It is devised as a response to SMEs' need for

²⁰ <https://www.globalreporting.org/information/news-and-press-center/Pages/New-project-to-develop-sustainability-reporting-capacity-for-SMEs.aspx>

²¹ <https://www.globalreporting.org/resourcelibrary/Starting-Points-2-G3.1.pdf>

assistance in selecting the most suitable environmental management tools according to internal

Organizational and external market demands. Tools covered range from environmental management systems, cleaner production assessment and environmental cost accounting to environmental performance measuring and reporting. www.em-navigator.net

EMAS Tool Kit for SMEs – This is a simple guide to assist small companies to implement an environmental management system that meets the requirements of EMAS. EMAS requirements are demanded by many EU clients, and Indian SMEs who wish to export will need to comply with EMAS. For such SMEs, this is an invaluable site. www.inem.org/emas-toolkit.

Environmental Management Tools for SMEs – A Handbook: This Handbook discussed how SMEs can use environmental management to improve business performance. It focuses on three questions: What is environmental management? Why should SMEs use it? How is the tool used? <http://reports.eea.eu.int/GH-14-98-065-EN-C/en>

Environmental Good Housekeeping Guide for Small and Medium-Sized Enterprises This guide is specifically designed for SMEs to identify simple, practical, common sense good housekeeping measures that can reduce the costs of production, enhance the company's overall productivity and mitigate environmental impact. www.inem.org/htdocs/inem_tools.html#Anchor-Environmental-51548

7.4 Researcher's Contribution

The journey of this research has helped the researcher gain insights into the environmental sustainability practices of small enterprises. Through this knowledge, the researcher has attempted to contribute in the following ways:

i) *To the current body of knowledge*

The approach used in this research was based on the product life cycle and the greening within each stage of it. This is a new approach in the research of green SMEs in India. Till now, the topic of greening has been mainly in large corporations. Very few studies are published on green SMEs in India. Amongst them, most concentrate on pollution, operations and waste management. This

seems to be the first study which establishes practices within the product life cycle. As mentioned in the earlier chapters, SMEs understand the economic benefits of greening within manufacturing. Also most regulation focuses on manufacturing but does not specific green design or green consumption or green disposal. For this reason, SMEs may not be aware of possibilities in the other stages. This will help SMEs to understand the various opportunities of greening right from the cradle (design stage) to the grave (disposal stage of the product).

ii) *To SME owners themselves*

In the course of this research this researcher found that many owners are not aware how to go about greening or improving on current green practices. There is almost no help coming from market or government agencies for this. With low awareness and no support mechanism in place, Indian SMEs are at a loss to understand how to improve green practices or what to invest in. This thesis offers a detailed approach for SMEs to get on the path of environmental sustainability. The approach given here is a step-by-step one which is easy to understand and without much technical jargon. Many international sources of best practices, networks and organizations especially for SMEs are mentioned in the thesis. This is expected to be useful for owners wishing to improve.

iii) *To policy makers*

Indian regulators and government agencies have overlooked SMEs for a very long time now. It is imperative that they must consider the problems and challenges facing SMEs in their quest for environmental sustainability. This thesis attempts to put forth the barriers to greening, factors which could possibly positively influence greening and other aspects specific to SMEs. With this, the researcher hopes, government agencies and ministries can get deeper insights when making decisions. A lot of examples of government interventions in other countries are discussed. Notably, examples from countries like UK, USA, Ireland, Korea, Japan and several countries from the European Union are discussed in detail.

Additionally several governmental and quasi governmental agencies have conducted studies with SMEs in their own countries. Notably, the European Commission, the OECD and UNEP, among others, have published their results which are also presented here. The researcher hopes that these examples and how to use them in Indian context, would give Indian regulators ideas to improve Indian SMEs.

In this manner, the researcher, through this study, has tried to make some contribution to the Indian society in general and SMEs in specific.

Bibliography

Bibliography

Chapter 1

1. Azzone, B., & Bertele, U. (1994). Exploiting Green Strategies for Competitive Advantage. *Long Range Planning* , 69-81.
2. Blundell, K., & Armstrong, F. (2007). *Energy Beyond Oil*. Oxford: Oxford University Press.
3. Elkington, J. (1997). *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*. Capstone.
4. Fischer, K., & Schot, J. (1993). *Environmental Strategies for Industry*. Washington DC: Island Press.
5. Friedman, M. (1970). Walking the talk:The business case for sustainable development. *The New York Times Magazine* .
6. GOI. (n.d.). *Ministry of MSME, India*. Retrieved December 20, 2012, from Ministry of MSME, India: http://msme.gov.in/msme_aboutus.htm
7. <http://www.unep.org/>. (2012, December 12). Retrieved December 12, 2012, from <http://www.unep.org/>: <http://www.unep.org/>
8. KPMG. (1997). *The environmental challenge and SMEsin Europe*. The Hague: KPMG.
9. Leakey, R. E. (1996). *The Sixth Extinction: Patterns of Life and the future of Mankind*. Anchor.
10. Lemmer, J. (2007). Cleaning up Development: EIA in Two of the World's Largest and Most Rapidly Developing Countries. *Environmental Law Review* , 275-301.
11. *Ministry of Environment & Forests*. (2012). Retrieved December 10 Dec, 2012, from Envfor.in: <http://envfor.nic.in/>
12. Ministry of MSME. (2011). *Annual Report 2011-12*. New Delhi: GOI.
13. Porter, M. E. (1980). *Competitive Strategy*. New York: Free Press.
14. Porter, M. E., & van der Linde, C. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *The Journal of Economic Perspectives* , 97.
15. Schumpeter, J. (1950). *Capitalism, Socialism and Democracy*. New York: Harper.

16. Sharma, A., Iyer, G., Mehrotra, A., & Krishnan, R. (2010). Sustainability and business-to-business marketing: A framework and implications. *Industrial Marketing Management* , 330-341.
17. Singh, N., & Brown, D. (1999, January). Environmental Regulations and Litigation in India. *Newsletter : International Society of Environmental Botanists* .
18. Tietenberg, T., & Lewis, L. (8th Edition). *Environmental & Natural Resources Economics*. Pearson.
19. UNEP. (n.d.). Retrieved August 27, 2012, from United Nations Environmental Programme:
<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=43>
20. *UNEP declaration*. (n.d.). Retrieved December 12, 2012, from UNEP declaration:
<http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503>
21. WCED. (1987). *Our Common Future*. Oxford University Press.
22. Wernerfelt, B. (1984). A resource-based view of the company. *Strategic Management Journal* , 171-180.
23. World Trade Organisation. (2010). *World Trade Report 2010*. WTO.

Chapter 2

1. Azzone, B., & Bertele, U. (1994). Exploiting Green Strategies for Competitive Advantage. *Long Range Planning* , 69-81.
2. Blundell, K., & Armstrong, F. (2007). *Energy Beyond Oil*. Oxford: Oxford University Press.
3. Elkington, J. (1997). *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*. Capstone.
4. Fischer, K., & Schot, J. (1993). *Environmental Strategies for Industry*. Washington DC: Island Press.
5. Friedman, M. (1970). Walking the talk: The business case for sustainable development. *The New York Times Magazine* .
6. GOI. (n.d.). *Ministry of MSME, India*. Retrieved December 20, 2012, from Ministry of MSME, India: http://msme.gov.in/msme_aboutus.htm
7. <http://www.unep.org/>. (2012, December 12). Retrieved December 12, 2012, from <http://www.unep.org/>: <http://www.unep.org/>

8. KPMG. (1997). *The environmental challenge and SMEsin Europe*. The Hague: KPMG.
9. Leakey, R. E. (1996). *The Sixth Extinction: Patterns of Life and the future of Mankind*. Anchor.
10. Lemmer, J. (2007). Cleaning up Development: EIA in Two of the World's Largest and Most Rapidly Developing Countries. *Environmental Law Review* , 275-301.
11. *Ministry of Environment & Forests*. (2012). Retrieved December 10 Dec, 2012, from Envfor.in: <http://envfor.nic.in/>
12. Ministry of MSME. (2011). *Annual Report 2011-12*. New Delhi: GOI.
13. Porter, M. E. (1980). *Competitive Strategy*. New York: Free Press.
14. Porter, M. E., & van der Linde, C. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *The Journal of Economic Perspectives* , 97.
15. Schumpeter, J. (1950). *Capitalism, Socialism and Democracy*. New York: Harper.
16. Sharma, A., Iyer, G., Mehrotra, A., & Krishnan, R. (2010). Sustainability and business-to-business marketing: A framework and implications. *Industrial Marketing Management* , 330-341.
17. Singh, N., & Brown, D. (1999, January). Environmental Regulations and Litigation in India. *Newsletter : International Society of Environmental Botanists* .
18. Tietenberg, T., & Lewis, L. (8th Edition). *Environmental & Natural Resources Economics*. Pearson.
19. *UNEP*. (n.d.). Retrieved August 27, 2012, from United Nations Environmental Programme:
<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=43>
20. *UNEP declaration*. (n.d.). Retrieved December 12, 2012, from UNEP declaration:
<http://www.unep.org/Documents.Multilingual/Default.asp?documentid=97&articleid=1503>
21. WCED. (1987). *Our Common Future*. Oxford University Press.
22. Wernerfelt, B. (1984). A resource-based view of the company. *Strategic Management Journal* , 171-180.
23. World Trade Organisation. (2010). *World Trade Report 2010*. WTO.

Chapter 3

1. Aaker, D. (1989). Managing assets and skills: the key to a sustainable competitive. *California Management Review* , 91-106.
2. Amit, R., & Schoemaker, P. (1993). Strategic assets and organizational rent. *Strategic Management Journal* , 33-46.
3. Azzone, B., & Bertele, U. (1994). Exploiting Green Strategies for Competitive Advantage. *Long Range Planning* , 69-81.
4. Balasundaram, N. (2009). Incidence of Strategic Planning in Small Business: An Overview. *BULETINUL Universității Petrol* , 11-17.
5. Bamberger, I. (1980). Development and Growth of Companies - A Theoretical Frame of Reference of research project concerning Small & Medium companies. *Unpublished* .
6. Bansal, P., & Roth, K. (2000). Why Companies Go Green: A Model of Ecological Responsiveness. *The Academy of Management Journal* , 717-736.
7. Barney, J. B. (2002). *Gaining and sustaining competitive advantage*. Reading: Addison-Wesley.
8. Beaver, G. (2003). Management and the Small Company. *Strategic Change* , 63-68.
9. Beaver, G., & Prince, C. (2002). Innovation, Entrepreneurship and Competitive Advantage in the Entrepreneurial Venture. *Journal of Small Business and Enterprise Development* , 28-37.
10. Bianchi, R., & Noci, G. (1996). Le esperienze di alcune imprese operanti in Italia: gli studi di caso. *Politecnico di Milano* .
11. Bognanno, M. (2012). *Why the BSC is just as effective for Small and Medium-sized Companies*. Boston: Harvard Business School Publishing.
12. Carland, J., & Carland, J. (2003). A model of entrepreneurial planning and its effect on Performance. *ASBE Annual conference*. Houston.
13. Chanaron, J., & Jolly, D. (1999). Technological Management. *Management Decision* , 613-620.
14. Chandler, A. (1962). *History of American Industrial Enterprise*. Cambridge, MA: MIT Press.

15. Chen, Y.-S., & al, e. (2006). The Influence of Green Innovation Performance on Corporate Advantage in Taiwan. *Journal of Business Ethics* , 331-339.
16. Chen, Y.-S., & Lai, S.-B. (2006). The influence of Green Innovation Performance on Corporate Advantage in Taiwan. *Journal of Business Ethics* , 331-339.
17. Clarke, J. (2004). Trade Associations: An Appropriate Channel for Developing Sustainable Practices in SMEs? *Journal of Sustainable Tourism* , 194-208.
18. de Eyto, A., & all, e. (2008). Strategies for Developing Sustainable Design Practice for students and SME Professionals. *European Journal of Engineering Education* , 331-342.
19. Deloitte. (2008). *Growth Opportunities for Indian SMEs*. Delhi: Deloitte Touche Tohmatsu India Pvt. Ltd.
20. Dilion, P., & Fischer, K. (1992). Environmental Management in Corporations. *Tufts University Center for Environmental Management* .
21. Esty, D. C., & Winston, A. S. (2009). *Green to Gold*. John Wiley & Sons.
22. Fischer, K., & Schot, J. (1993). *Environmental Strategies for Industry*. Washington DC: Island Press.
23. Gadenne, D., Kennedy, J., & McKeiver, C. (2009). An Empirical Study of Environmental Awareness and Practices in SMEs. *Journal of Business Ethics* , 45-63.
24. Gelderen, v. M., Frese, M., & Thurik, R. (2000). Strategies, Uncertainty and Performance of Small Business startups. *Small Business Economics* , 165-181.
25. Gerrans, P. A., & W.E., H. (2000). Sustainable Development and Small and Medium-Sized Enterprises: A long way to Go. In R. Hillary, *Small and Medium Sized Enterprises and the Environment* (pp. 75-81). Sheffield: Greenleaf Publishing.
26. Gerstenfeld, A., & Roberts, H. (2000). Size matters : Barriers and Prospects for Environmental Management. In R. Hillary, *Small and Medium-sized Enterprises and the Environment* (pp. 106-118). Sheffield: Greenleaf Publishing.
27. Ghemavat, P. (2006, February). Creating competitive advantage. *Harvard Business Review* .
28. Ghemavat, P. (2010, March). Finding your strategy in the new landscape. *Harvard Business Review* , pp. 2-6.

29. Ghemavat, P. (1986, Sept-Oct). Sustainable Advantage. *Harvard Business review* .
30. Gibb, A. S. (1985). Strategic Awareness, Personal Commitment and the Process of Palling in the Small Businesses. *Journal of Management Studies* , 591-631.
31. Gibson, B., & Casser, G. (2005). Longitudinal analysis of relationships between planning and performance in Small Companies. *Small Business Economics* , 207-222.
32. Govt, Queensland. (2011). *Green Marketing, the competitive advantages of sustainability*. Government of Queensland.
33. Hall, R. (1989). The management of intellectual assets: a new corporate perspective. *Journal of General Management* , 53.
34. Hambrick, D. C. (1983). Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types. *Hambrick, D. C. Some tests of the effectiveness and functional attributes of Academy of Management Journal* , 5-25.
35. Hart, S. (1995). A Natural-Resource based view of the Company. *Academy of Management Review* , 986-1014.
36. Hillary, R. (2004). Environmental management systems and the Smaller Enterprise. *Journal of Cleaner Production* , 561-569.
37. Hitchens, D. C. (2004). Competitiveness, environmental performance and management of SMEs. *Greener Management International* , 45-57.
38. Hobbs, J. (2000). Promoting Cleaner Production in SMEs. In R. Hilary, *SMEs and the Environment* (pp. 149-157). Sheffield: Greenleaf Publishing.
39. Hofer, C., & Schendel, D. (1978). *Strategy formulation:Analytical Concepts*. St.Paul, MN: West.
40. Iraldo, F., Testa, F., & Frey, M. (2010). Environmental Management System and SMEs: EU Experience, Barriers and Perspectives. In S. K. Sarkar, *Environmental Management* (p. 258).
41. Iraldo, F., Testa, F., & Frey, M. (2010). Environmental Management System and SMEs: EU Experience, Barriers and Perspectives. In S. Sarkar, *Environmental Management* (p. 258). Sciyo: Intech.
42. Itami, H. (1987). *Mobilizing Immovable Assets*. Cambridge, MA: Harvard University Press.

43. Jenkins, H. (2006). Small business champions for corporate social responsibility. *Journal for Business Ethics* , 241-256.
44. Jørgensen, G. (2004). How do Small business managers make Strategic business decisions? A model of Process. *European Journal of Marketing* , 659-674.
45. Kak, A., & Sushil. (2002). Sustainable competitive advantage with core competence: A review. *Global Journal of Flexible Manufacturing systems* , 23-38.
46. Kaplan, R., & Norton, D. (1992, Vol 70). The balanced scorecard – measures that drive performance. *Harvard Business Review* , pp. 71-79.
47. Kay, J. (1993). *Foundations of Corporate Success*. Oxford: Oxford University Press.
48. KPMG. (1997). *The Environmental Challenge and SMEs in Europe*. KPMG.
49. Kraus Sascha, S. R. (2007). *Energizing Management through Innovation and Entrepreneurship: European Research & Practice*. London: Routledge.
50. Lagace, D., & Bourgalt, M. (2003). Linking manufacturing improvement programs to the competitive priorities of Canadian SMEs. *Technovation* , 705-15.
51. Lampe, M., Ellis, S., & Drummond, C. (1991). What companies are doing to meet environmental protection responsibilities. *Proceedings of the International Association for Business and Society*, (pp. 527-537).
52. Lee, K. (2000). Strategic Corporate Change Towards Sustainable Enterprise in the Environment Era. *Proceedings of the Business Strategy and Environment Conference* (pp. 271-278). European Research Press, Shipley.
53. Lee, K.-H. (2009). Why and how to adopt green management into business organizations?: The case study of Korean SMEs in manufacturing industry. *Management Decision* , 1101-1121.
54. Lewis, K., & Cassells, S. (2010). Barriers and drivers for environmental practice uptake in SMEs: A New Zealand perspective. *International Journal of Business Studies* , 7-21.
55. Lukman, R., & all, e. (2009). Fostering Collaboration between Universities regarding regional Sustainability Initiatives - the University of Maribor. *Journal of Cleaner Production* , 1143-1153.
56. Lyles, M. e. (1993). Formal Planning in Small Business: Increased Strategic Choices. *Journal of Small Business Management* , 38-50.

57. Man, T., Lau, T., & Chan, K. (2002). The competitiveness of small and medium enterprises: A conceptualisation with focus on entrepreneurial competencies. *Journal of Business Venturing* , 123-142.
58. Mazur, E. (2012). *Green Transformation of Small Businesses*. Retrieved December 13, 2013, from OECD Working Papers: <http://dx.doi.org/10.1787/5k92r8nmfgxp-en>
59. Mazzarol, T. (2004). Strategic Management of Small Companies: A proposed framework for Entrepreneurial Ventures. *SEAANZ conference - Entrepreneurship as the Way of the Future*. Brisbane.
60. Megacom. (2008). *A Study on Environment as an Aspect of MSME Policy development in Egypt*. Cairo: International Development Research Centre & CIDA.
61. Mintzberg, H. (1978). Patterns in strategy formulation. *Management Science* , 934-948.
62. Mintzberg, H. W. (1985). Strategies, Deliberate and Emergent, . *Strategic Management Journal* , 62-72.
63. Moorthy, M. K., & al, e. (2012). Drivers for Malaysian SMEs to Go Green. *International Journal of Academic Research in Business and Social Sciences* .
64. MSME Task Force. (2010). *Report of Prime Minister's Task Force on MSMEs*. New Delhi: Government of India.
65. Nafziger, D., Ahmed, N., & Montagno, R. (2003). Perceptions of environmental consciousness in US small Businesses: An empirical study. *Advanced Management Journal* , 68.
66. OECD. (1994). *Globalization and Competitiveness: Relevant indicators*. Paris: OECD.
67. OECD. (2011). *OECD Working Papers*. Retrieved December 10, 2013, from OECD: www.oecd.org
68. OECD. (2007). *Small Business and Environmental Compliance*. OECD.
69. Orpen, C. (1993). Strategic Planning, Scanning Activities and the Financial Performance of Small Companies. *Journal of Small Business and Entrepreneurship* , 62-72.
70. Orsato, R. J. (2006). Competitive Environmental Strategies. *California Management Review* , 127-143.

71. Ortiz Avram, D., & Kühne, S. (2008). Implementing Responsible Business Behavior from a Strategic Management Perspective: Developing a Framework for Austrian SMEs. *Journal of Business Ethics* , 463-475.
72. Parker, C., & all, e. (2009). A review of interventions to encourage SMEs to make environmental improvements. *Environment and Planning* , 279-301.
73. Petts, J., & Herds, A. (1999). The climate and culture of environmental compliance within SMEs. *Business Strategy and the Environment* .
74. Piest, B. (1994). Planning Comprehensiveness and Strategy in SMEs. *Small Business Economics* , 387-395.
75. Porter, M. E. (1985). *Competitive Advantage : Creating and Sustaining Superior Performance*. Free Press.
76. Porter, M. E. (1980). *Competitive Strategy*. New York: Free Press.
77. Porter, M. E., & van der Linde, C. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *The Journal of Economic Perspectives* , 97.
78. Posner, B. (1985). Real Entrepreneurs don't plan. *Inc* , pp. 129-132.
79. Powell, T. C. (2001). Competitive Advantage: Logical and Philosophical considerations. *Strategic Management Journal* , 875-888.
80. Rangone, A. (1999). A Resource-based approach to Strategy Analysis in Small-Medium Sized Enterprises. *Small Business Economics* , 233-248.
81. Revell, A., & A, B. R. (2007). The business case for sustainability? An examination of small companies in the UK's construction and restaurant sectors. *Business Strategy and the Environment* , 404-420.
82. Revell, A., & all, e. (2009). Small businesses and the environment: Turning over a new leaf? *Business Strategy and the Environment* .
83. Rowe, J., & Hollingsworth, D. (1996). Improving environmental performance of SMEs: a study in Avon. *Eco-management and Auditing* , 97-107.
84. Rumelt, R. (2011). *Good strategy, bad strategy*. New York: Crown Business.
85. Schwenk, C. S. (1994). Effects of Formal Strategic Planning on Financial Performance in Small Companies. A Meta – Analysis,. *Entrepreneurship Theory and Practice* , 53-64.

86. Sexton, D., & van Auken, P. (1985). A longitudinal study of small business strategic planning. *Journal of Small Business Management* , 7-15.
87. Shrivastava, P. (1995). Environmental Technologies and Competitive Advantage. *Strategic Management Journal* , 183-200.
88. Simpson, M., Taylor, & Barker, K. (2004). Environmental Responsibility in SMEs: Does It Deliver Competitive Advantage? *Business Strategy and the Environment* , 156–171.
89. Singh, R. K., Garg, S. K., & Deshmukh, S. (2010). Strategy development by Small Scale industries in India. *Industrial Management and Data* , 1074-1093.
90. Smith, A., & Duff, C. (2000). Small companies and the environment: factors that influence SME's environmental behavior. In R. Hillary, *SMEs and the Environment* (pp. 24-34). Sheffield: Greenleaf .
91. Steiner, G. (1967). Approaches to Long Range Planning for Smaller Business, California Management. *California Management* , pp. 3-16.
92. Stewart, K. (2002). Formal Business Planning and Small Business Success: A survey of small businesses with an International Focus. *Journal of American Academy of Business* , 42-46.
93. Stonehouse, G., & Pemberton, J. (2002). Strategic Planning in SMEs - Some Empirical Findings. *Management Decision* , 853-861.
94. Studer, S., Welford, R., & Hills, P. (2008). SMEs and voluntary environmental initiatives: A study of stakeholders perspectives. *Journal of Environmental Planning and Management* , 285-301.
95. Sumer, K., & Bayraktar, C. a. (2012). Business Strategies and Gaps in Porter'S Typology: A literature Review. *Journal of Management Research* , 100-119.
96. Taylor, N., & all, e. (2003). Achieving sustainable business, a study of perceptions o fenvironmental best practice by SMEs in South Yorkshire. *Environment and Planning C: Government and Policy* , 89-105.
97. UNEP. (2012). *The Business case for a Green economy*. UNEP.
98. Upton, N., Teal, E., & Felan, J. (2001). Strategicv and Business Planning practices of fast growth Family Companies. *Journal of Small Business Management* , 60-72.
99. Von Neumann, J., & Morgenstern, O. (1947). *Theory of games and economic behavior* . Princeton: Princeton University Press.

100. Walker, E., & Brown, A. (2004). What Success Factors are Important to Small Business Owners? *International Small Business Journal* .
101. Weerasiri, S., & Zhengang, Z. (2012). Attitudes and Awareness towards Environmental Management and its Impact on Environmental Management Practices (EMPs) of SMEs in Sri Lanka. *Journal of Social and Development Sciences* , 16-23.
102. Wernerfelt, B. (1984). A resource-based view of the company. *Strategic Management Journal* , 171-180.
103. Williamson, D., Lynch-Wood, G., & Ramsay, J. (2006). Drivers of Environmental Behaviour in Manufacturing SMEs and the Implications for CSR. *Journal of Business Ethics* , 317-330.
104. World Trade Organisation. (2010). *World Trade Report 2010*. WTO.
105. Worthington, I., & Patton, D. (2005). Strategic Intent in the Management of the Green Environment within SMEs. *Long Range Planning* , 197-212.

Chapter 4

1. Anglada, M. (2000). Small and medium sized enterprises' perceptions of the environment- A study from Spain. In R. Hillary, *Small and medium sized enterprise and the environment* (pp. 61-74). Greenleaf.
2. Barney, J. B. (2002). *Gaining and sustaining competitive advantage*. Reading: Addison-Wesley.
3. Burns, R., & Burns, R. (2008). *Business Research Methods and Statistics using SPSS*. London: Sage Publications.
4. Campbell-Hunt, C. (2000). What have we learnt about Generic Competitive Strategy? A Meta-Analysis. *Strategic Management Journal* , 127-154.
5. Creswell, J. W. (2006). *Qualitative inquiry and research design: Choosing among five traditions*. Sage.
6. D&B. (2010). *D&B – Saffron Capital Advisors SME Cluster Series 2010: Pune*. Pune: Dun & Bradstreet.
7. Department, P. (2013). *Economic Survey of Maharashtra 2012-13*. Mumbai: Government of Maharashtra.

8. Eagly, A., & Chaiken, S. (1996). Attitude Structure and Function. In F. S. Gilbert D, *The Handbook of Social Psychology*. New York: McGraw-Hill.
9. Hart, S. (1995). A Natural Resource Based View of the Company. *Academy of Management Review* , 986-1014.
10. Jabareen, Y. (2009). Building a Conceptual Framework: Philosophy, Definitions, and Procedure. *International Journal of Qualitative Methods* , 49-62.
11. Miles, M. B., & Huberman, M. A. (1994). *Qualitative Data Analysis: An Expanded Sourcebook* . Sage.

Chapter 5

1. Gadenne, D., Kennedy, J., & McKeiver, C. (2008). An Empirical Study of Environmental Awareness and Practices in SMEs. *Journal of Business Ethics* , 45-63.
2. Gerrans, P., & Hutchinson, W. (2000). Sustainable Development and Small and Medium-Sized Enterprises: A Long Way to Go. In R. Hillary, *Small and Medium-Sized Enterprises and the Environment: Business Imperatives* (pp. 75-81). Sheffield: Greenleaf Publishing.
3. Hillary, R. (1999). *Evaluation of Study Reports on the Barriers, Opportunities and Drivers for Small and Medium Sized Enterprises in the Adoption of Environmental Management Systems*. London: Department of Trade and Industry Environment Directorate .
4. Peters, M., & Turner, R. (2002). SME Environmental Attitudes and Participation in Local-Scale Voluntary Initiatives: Some Practical Applications. *CSERGE* .
5. Simpson, M., Taylor, N., & Barker, K. (2004). Environmental responsibility in SMEs: does it deliver competitive advantage? *Business Strategy and the Environment* , 156.
6. Williamson, D., & Lynch-Wood, G. (2006). Drivers of Environmental Behaviour in Manufacturing SMEs and the Implications for CSR. *Journal of Business Ethics* , 317-330.

Chapter 6

1. EMAS. (2013). *Environment, EMAS*. Retrieved September 15, 2013, from European Commission: <http://ec.europa.eu/environment/emas/>

2. Esty, D. C., & Winston, A. S. (2009). *Green to Gold*. John Wiley & Sons.
3. Mazur, E. (2012). *Green Transformation of Small Businesses: Achieving and Going Beyond Environmental Environmental*. Retrieved December 10, 2013, from OECD iLibrary: <http://www.oecd-ilibrary.org/environment/g>
4. NPC. (n.d.). *NPC*. Retrieved September 15, 2013, from NPC: <http://www.npcindia.gov.in/>
5. Orsato, R. J. (2006). Competitive Environmental Strategies. *California Management Review* , 127-143.
6. Sahu, G. (2010). Implementation of Environmental Judgements in Context: A comparative analysis of Dahanu Thermal Power Plant pollution case in Maharashtra and Vellore Leather industrial pollution case in Tamil Nadu. *Law Environment and Development Journal* , 335.

Chapter 7

1. EMAS. (2013). *Environment, EMAS*. Retrieved September 15, 2013, from European Commission: <http://ec.europa.eu/environment/emas/>
2. Esty, D. C., & Winston, A. S. (2009). *Green to Gold*. John Wiley & Sons.
3. Mazur, E. (2012). *Green Transformation of Small Businesses: Achieving and Going Beyond Environmental Environmental*. Retrieved December 10, 2013, from OECD iLibrary: <http://www.oecd-ilibrary.org/>
4. NPC. (n.d.). *NPC*. Retrieved September 15, 2013, from NPC: <http://www.npcindia.gov.in/>
5. Orsato, R. J. (2006). Competitive Environmental Strategies. *California Management Review* , 127-143.
6. Sahu, G. (2010). Implementation of Environmental Judgements in Context: A comparative analysis of Dahanu Thermal Power Plant pollution case in Maharashtra and Vellore Leather industrial pollution case in Tamil Nadu. *Law Environment and Development Journal* , 335.

Demographics

*1. Name of the firm

*2. What activities is the firm engaged in?

	Principal Activity	Support Activity
Manufacturing	☐	☐
Trading	☐	☐
Servicing	☐	☐
Consulting	☐	☐
Others	☐	☐

*3. Total number of employees in the firm

*4. Number of years in business

*5. Name of Respondent

*6. Designation of the respondent

7. Approximate annual turnover

*8. Please rank these types of customers by composition in your total client list. (Rank 1 = most number of my clients are this type)

	Large multinational customers
	Large Indian customers
	Small and medium Indian customers (SMEs)
	Tiny customers
	Foreign customers - importers/agents
	Foreign customers - manufacturers
	Government firms
	Traders
	Others

9. Which certifications does your firm have for the current year?

To Identify critical issues that SMEs face

10. How would you rate the following issues for your firm?

	Very Critical	Somewhat Critical	Not critical	Does not exist	Not aware
Issues of competitiveness (product, service, price, MNCs, cheap)	☐	☐	☐	☐	☐
Issues of Human Resources (hire, retain, train)	☐	☐	☐	☐	☐
Marketing & Sales issues	☐	☐	☐	☐	☐
Financial Issues (managing funds, working capital)	☐	☐	☐	☐	☐
Improving internal systems (Quality, productivity, processes)	☐	☐	☐	☐	☐
Issues of growth (where, how)	☐	☐	☐	☐	☐
Foreign markets (imports, exports)	☐	☐	☐	☐	☐

Other (please specify)

11. Which of these statements is applicable for your business?

	Very applicable	Somewhat applicable	Can't Say	Not Applicable	Not relevant
Our products have a competitive differentiation, with which we do not need to fight on price	☐	☐	☐	☐	☐
Our products have a competitive differentiation but we do have to fight on price	☐	☐	☐	☐	☐
Our products match industry offerings, but we do not have to fight on price	☐	☐	☐	☐	☐
Our products match industry offerings, but we have to fight on price	☐	☐	☐	☐	☐

To Assess awareness towards the Environment

12. Which of these statements do you agree with?

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Disagree	Do not Know
Industrial activities are responsible for environmental degradation	☐	☐	☐	☐	☐
SMEs do not have a significant impact on the environment	☐	☐	☐	☐	☐
Global warming is a result of human activities	☐	☐	☐	☐	☐

13. Who sets the rules and standards for Environmental norms in your industry?

14. Do you have the latest standards of Environmental Standards for your industry?

☐ Yes ☐ No ☐ Don't Know

15. Which of these following terms have you heard of?

	Yes, heard of this	No, not heard
Sustainability	☐	☐
Triple Bottom Line	☐	☐
Global Reporting Initiatives	☐	☐

16. In the last one year, have you attended any training, conference or seminar on the Environment?

☐ Yes
☐ No

To assess the attitude of SMEs towards Environmental Regulation and Perform...

17. How do the Indian Environmental rules and regulations compare with that of advanced countries?

☐ Far below standards
☐ Somewhat below standards
☐ At par, comparable standards
☐ Somewhat better
☐ Far better
☐ Don't Know

18. Which of these business practices would you

	Have not heard of this	Am aware of this, but do not use it in our firm	Practice this in our firm
Lean management	☐	☐	☐
Six Sigma	☐	☐	☐
World Class Manufacturing	☐	☐	☐
Environmental Management Systems	☐	☐	☐
ISO 14000	☐	☐	☐
Clean tech	☐	☐	☐
GreenCo rating of CII	☐	☐	☐
Carbon Footprint	☐	☐	☐
Life Cycle Assessment	☐	☐	☐
Ecological Footprint	☐	☐	☐

19. Are you aware of any Clean technologies for your industry/business?

☐ Yes ☐ No ☐ Don't know

20. In the last one year, have you taken any steps to improve your environmental compliance?

☐ Yes ☐ No ☐ Don't Know

21. Please check the option which best describes the following:

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Disagree	Don't know
When industries manage their energy, water and emissions, this benefits them	☐	☐	☐	☐	☐
Improving the environmental performance should be the responsibility of every business	☐	☐	☐	☐	☐
Government should drive environmental performance of industries	☐	☐	☐	☐	☐
Environmental regulations should be tailored for the SME sector	☐	☐	☐	☐	☐
In our business, meeting environmental regulations is expensive	☐	☐	☐	☐	☐
In our business, most customers are not concerned about our environmental performance	☐	☐	☐	☐	☐
In our business, most customers would not pay more for green products or practices	☐	☐	☐	☐	☐
In our business, most competitors do not strictly comply with environmental regulations	☐	☐	☐	☐	☐
In our business, green practices add costs	☐	☐	☐	☐	☐
In our business, green practices add costs but also result in savings	☐	☐	☐	☐	☐
Undertaking voluntary green practices could negatively affect our cost competitiveness	☐	☐	☐	☐	☐

22. In your business, which factors are holding you back from undertaking Green Practices?

- ☐ Cash flow (Spare cash is locked up)
- ☐ Financial constraints (no spare cash)
- ☐ Lack of knowledge, awareness
- ☐ Requisite skills in employees
- ☐ Competitive pressures
- ☐ Time constraints - Too much work
- ☐ Unattractive Return on Investment
- ☐ Long Return on Investment
- ☐ Lack of government support
- ☐ Lack of industry support (associations)
- ☐ Others

To understand the Level of Green Performance in SMEs

23. Which of these best describes the Quality Management practice of your firm?

	Yes	No	Don't know
We have a formal QMS certification (ISO)	☐	☐	☐
We have a designated QA team or individual	☐	☐	☐
In our industry, we lead the quality standards	☐	☐	☐
In our industry, we meet the quality requirements	☐	☐	☐

24. Please choose the appropriate option

	Yes	No	Don't Know	Not applicable
Does your Vision-Mission statement mention the environment?	☐	☐	☐	☐
If yes, do have you set targets for environmental performance?	☐	☐	☐	☐
Do you have a formalized Environmental Management System? (ISO 14000)	☐	☐	☐	☐
Do you have an employee designated as Environment Officer?	☐	☐	☐	☐
Do you have environment posters/communication displayed?	☐	☐	☐	☐
Do you invite employee suggestions for environmental improvements?	☐	☐	☐	☐
Do you have an environmental consultant?	☐	☐	☐	☐
While buying new equipment, do you consider the environmental aspects?	☐	☐	☐	☐

25. Please select the right option

	Yes, we treat it and discharge	Yes, but we do not treat it	No, we do not generate
We generate fumes/air emissions	☐	☐	☐
We generate effluent	☐	☐	☐
We generate scrap	☐	☐	☐

26. Please select the option which represents your firm's practice

	Yes, at Plant level (aggregate)	Yes, at Department level	Yes, at Machine level	No, we do not measure
We monitor the direct Energy consumption	☐	☐	☐	☐
We monitor our the direct Water consumption	☐	☐	☐	☐
We measure the Process Waste	☐	☐	☐	☐
We monitor indirect Energy consumption	☐	☐	☐	☐
We monitor indirect Water consumption	☐	☐	☐	☐

27. Choose the option which best describes the Environmental Management in your firm

	Yes	No	Do Not Know
We comply with all regulatory standards (Air, water, discharge)	☐	☐	☐
We exceed regulatory standards	☐	☐	☐
We are among the leaders in our industry for regulatory compliance	☐	☐	☐
We have a formal Environmental Management System	☐	☐	☐
We have a designated Environmental Officer	☐	☐	☐

28. During product design, we check for environmental aspects so that the product

	Yes	No	Don't Know	Not applicable
Has lower material consumed	☐	☐	☐	☐
Can use cleaner technologies in production	☐	☐	☐	☐
Can use recycled content	☐	☐	☐	☐
Has longer life for customer	☐	☐	☐	☐
Has lower consumable usage in its use	☐	☐	☐	☐
Has easy recyclability	☐	☐	☐	☐
Can be discarded in an environmentally friendly way	☐	☐	☐	☐

29. Check the option which best describes your firm's activities

	Yes	No	Don't Know	Not Applicable
During supplier selection, do you check vendor's quality management?	☐	☐	☐	☐
During supplier selection, do you check vendor's environmental management?	☐	☐	☐	☐

30. In the last 2 years,

- ☐ We have reduced energy consumed per unit manufactured
- ☐ We have reduced our emissions per unit manufactured
- ☐ We have increased the recycle content per unit manufactured
- ☐ We have reduced the toxic waste generated
- ☐ We have stopped making products which were environmentally harmful
- ☐ We study environmental impacts of products in design stage
- ☐ Our employees are involved in environmental awareness

31. In the last 2 years, have you won any award for

	Yes	No
Quality Management (Customer or Association)	☐	☐
Environmental Management	☐	☐
Social Service	☐	☐

Other (please specify)

32. Do you communicate your Environmental efforts to Customers?

- ☐ Yes, in product brochures
- ☐ Yes, in our proposals or quotations
- ☐ Yes, only on websites
- ☐ Yes, during discussions
- ☐ Yes, only when customers asks for
- ☐ No we do not communicate

33. From the environmental performance of your firm, which of these benefits have you observed?

- ☐ Advantage with customers during negotiations
- ☐ Cost saving from reduced energy, material or waste
- ☐ Cost saving from increased recycled content
- ☐ Improved image in society
- ☐ Gaining new customers who seek environmental performance standards
- ☐ Benefit from bankers
- ☐ Benefit from Insurance company
- ☐ Attract better employees
- ☐ Better morale of employees
- ☐ Lower environmental risks
- ☐ Improvement in quality
- ☐ Export opportunities
- ☐ None of the above
- ☐ Others

To establish the role of Stakeholders in adoption of Green Business Practic...

34. In the last one year, which of these has influenced your Environmental Performance?

	Strongly influenced	Somewhat influenced	No influence	Can't say
Regulatory Bodies (PCBs)	☐	☐	☐	☐
Customers	☐	☐	☐	☐
Society/community	☐	☐	☐	☐
Employees	☐	☐	☐	☐
Insurance firms	☐	☐	☐	☐
Bankers	☐	☐	☐	☐
Investors	☐	☐	☐	☐
Personal awareness	☐	☐	☐	☐
Other (please specify)				

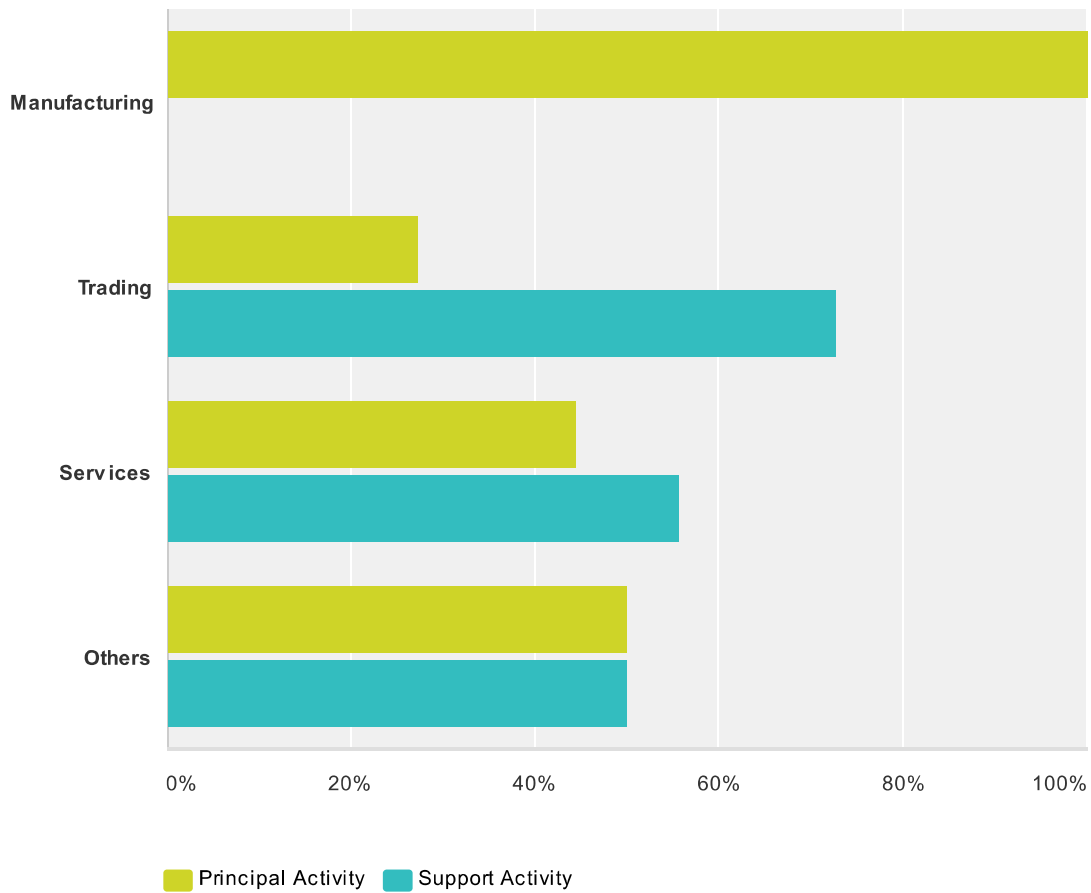
35. Which of these statements do you agree?

	Strongly Agree	Somewhat Agree	Neither agree nor disagree	Do not agree
For SMEs, regulatory bodies have the most important role	☐	☐	☐	☐
Our customers can influence us to improve our Environmental performance	☐	☐	☐	☐
Financial incentives by banks or insurance firms can help SMEs prioritize environmental issues	☐	☐	☐	☐
Society is not aware of SMEs environmental violations	☐	☐	☐	☐
Media is not aware of SMEs environmental violations	☐	☐	☐	☐
Green practices should be shared for SMEs	☐	☐	☐	☐
Benefits of Green practices are not easily understood by SMEs	☐	☐	☐	☐
Government should offer financial incentives for SMEs to improve Green Performance	☐	☐	☐	☐
Government should offer non-financial incentives for SMEs to improve Green Performance	☐	☐	☐	☐

SME Environmental Practices

Q2 What activities is the firm engaged in?

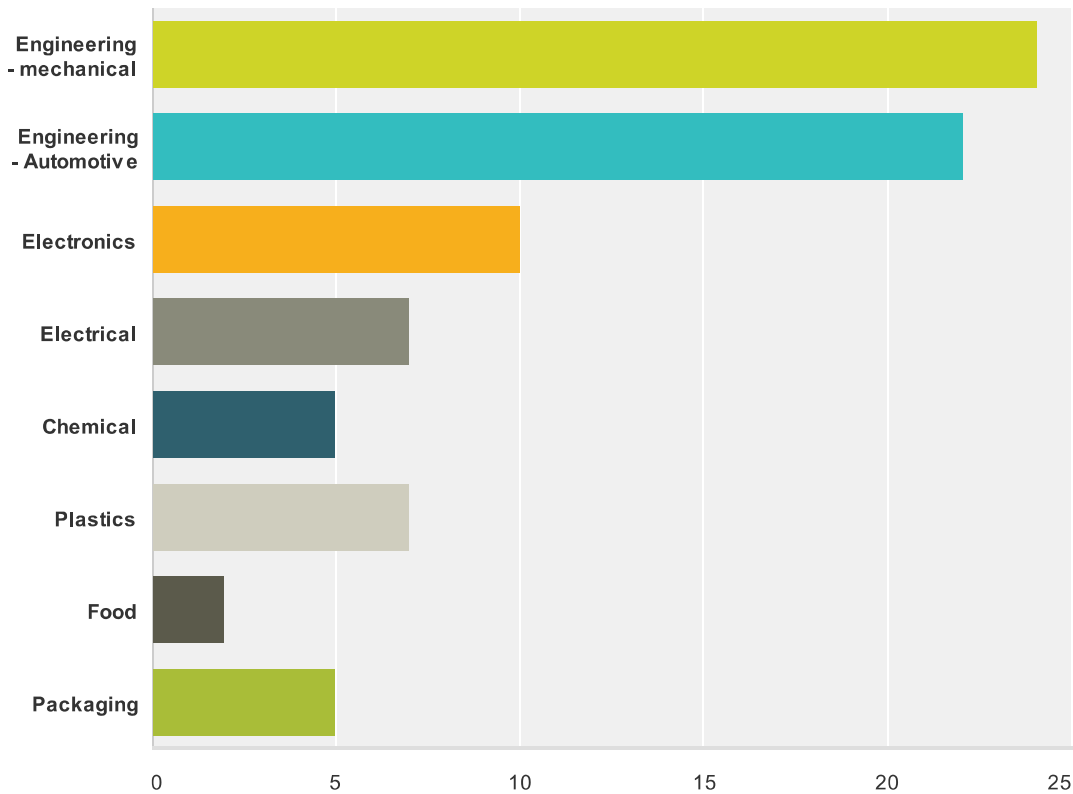
Answered: 60 Skipped: 0



	Principal Activity	Support Activity	Total
Manufacturing	100% 57	0% 0	57
Trading	27.27% 3	72.73% 8	11
Services	44.44% 8	55.56% 10	18
Others	50% 1	50% 1	2

Q8 In which industry is your primary business in?

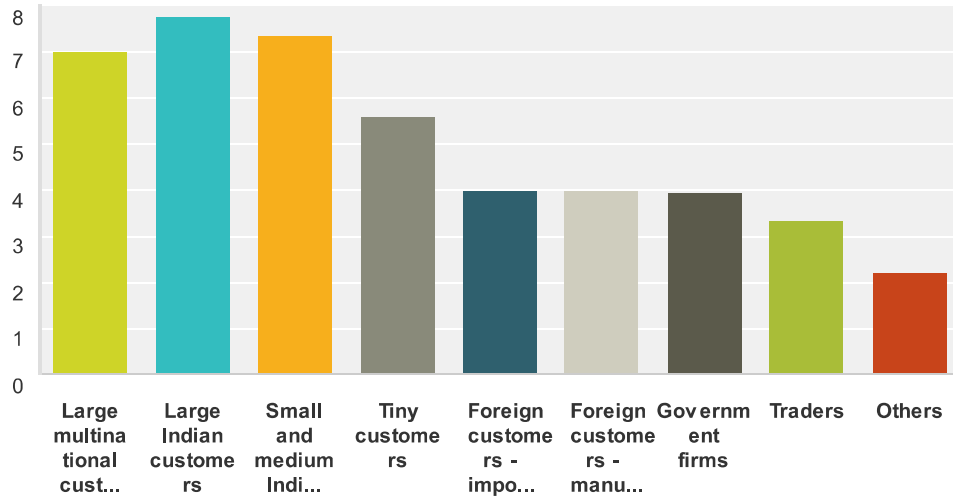
Answered: 50 Skipped: 10



Answer Choices	Responses	
Engineering - mechanical	48%	24
Engineering - Automotive	44%	22
Electronics	20%	10
Electrical	14.00%	7
Chemical	10%	5
Plastics	14.00%	7
Food	4%	2
Packaging	10%	5
Total Respondents: 50		

**Q9 Please rank these types of customers by composition in your total client list.
(Rank 1 = most number of my clients are this type)**

Answered: 60 Skipped: 0



	1	2	3	4	5	6	7	8	9	Total	Average Ranking
Large multinational customers	26.67% 16	23.33% 14	20% 12	10% 6	3.33% 2	8.33% 5	3.33% 2	5% 3	0% 0	60	6.97
Large Indian customers	36.67% 22	33.33% 20	16.67% 10	6.67% 4	1.67% 1	0% 0	3.33% 2	0% 0	1.67% 1	60	7.73
Small and medium Indian customers (SMEs)	28.33% 17	13.33% 8	33.33% 20	15% 9	6.67% 4	3.33% 2	0% 0	0% 0	0% 0	60	7.32
Tiny customers	0% 0	13.33% 8	5% 3	43.33% 26	21.67% 13	5% 3	6.67% 4	3.33% 2	1.67% 1	60	5.58
Foreign customers - importers/agents	0% 0	0% 0	3.33% 2	5% 3	38.33% 23	21.67% 13	11.67% 7	11.67% 7	8.33% 5	60	3.98
Foreign customers - manufacturers	0% 0	5% 3	6.67% 4	5% 3	10% 6	43.33% 26	8.33% 5	10% 6	11.67% 7	60	3.97
Government firms	3.33% 2	6.67% 4	8.33% 5	1.67% 1	6.67% 4	8.33% 5	51.67% 31	6.67% 4	6.67% 4	60	3.93
Traders	1.67% 1	5% 3	5% 3	8.33% 5	6.67% 4	3.33% 2	8.33% 5	58.33% 35	3.33% 2	60	3.32
Others	3.33% 2	0% 0	1.67% 1	5% 3	5% 3	6.67% 4	6.67% 4	5% 3	66.67% 40	60	2.20

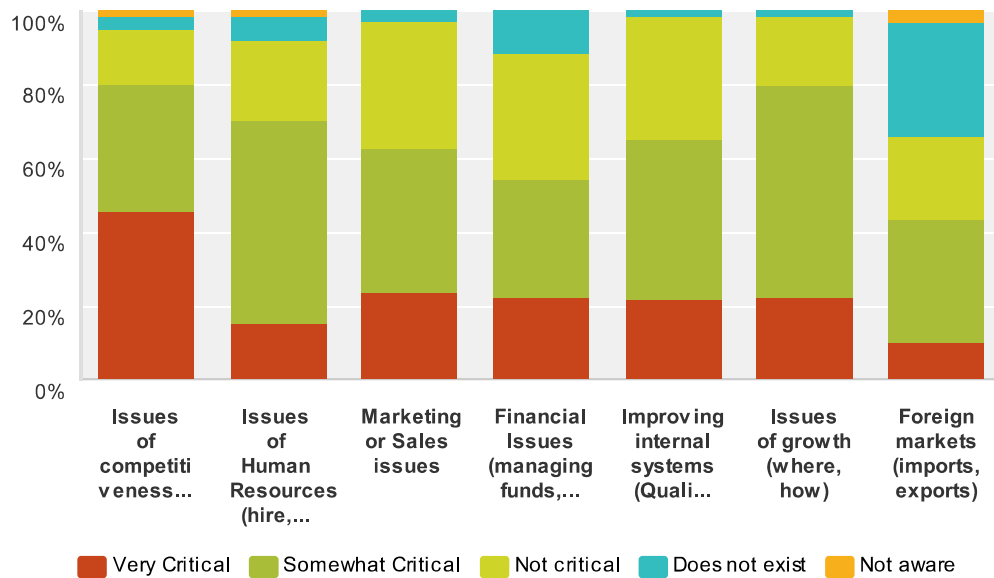
Q10 Which certifications does your firm have for the current year?

Answered: 50 Skipped: 10

SME Environmental Practices

Q11 How would you rate the following issues for your firm?

Answered: 60 Skipped: 0



	Very Critical	Somewhat Critical	Not critical	Does not exist	Not aware	Total
Issues of competitiveness (product, service, price, MNCs)	45.76% 27	33.90% 20	15.25% 9	3.39% 2	1.69% 1	59
Issues of Human Resources (hire, retain, train)	15% 9	55.00% 33	21.67% 13	6.67% 4	1.67% 1	60
Marketing or Sales issues	23.73% 14	38.98% 23	33.90% 20	3.39% 2	0% 0	59
Financial Issues (managing funds, working capital)	22.03% 13	32.20% 19	33.90% 20	11.86% 7	0% 0	59
Improving internal systems (Quality, productivity, processes)	21.67% 13	43.33% 26	33.33% 20	1.67% 1	0% 0	60
Issues of growth (where, how)	22.03% 13	57.63% 34	18.64% 11	1.69% 1	0% 0	59
Foreign markets (imports, exports)	10.34% 6	32.76% 19	22.41% 13	31.03% 18	3.45% 2	58

Q12 Which of these statements is applicable for your business?

Answered: 60 Skipped: 0

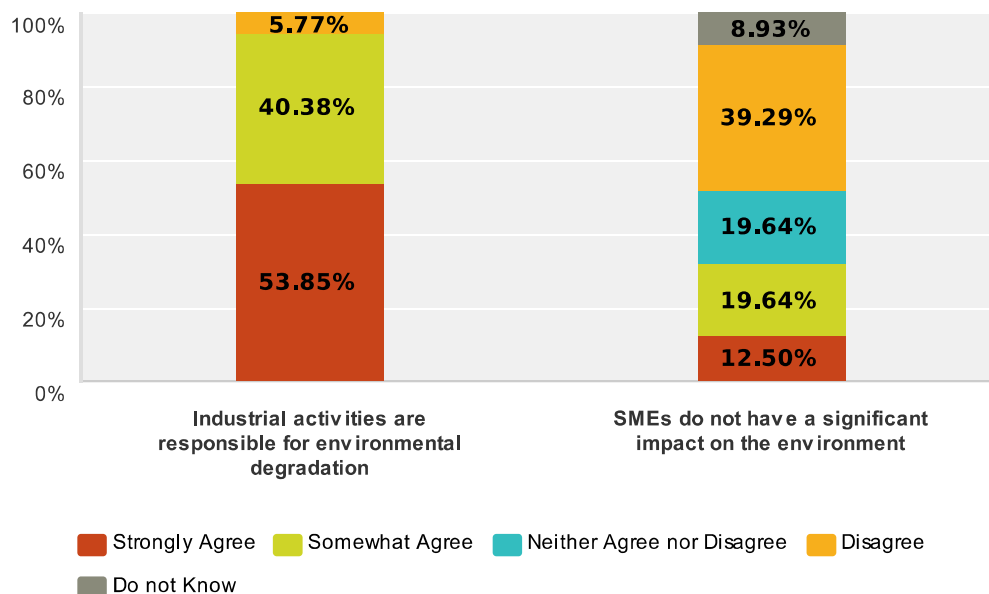


	Very applicable	Somewhat applicable	Can't Say	Not Applicable	Not relevant	Total
Our products have a competitive differentiation, we do not need to fight for our price	19.64% 11	41.07% 23	10.71% 6	25% 14	3.57% 2	56
Our products have a competitive differentiation but we have to fight for our price	34.48% 20	37.93% 22	3.45% 2	17.24% 10	6.90% 4	58
Our products match industry offerings, we do not have to fight for our price	14.81% 8	22.22% 12	9.26% 5	48.15% 26	5.56% 3	54
Our products match industry offerings, but we have to fight for our price	28.57% 16	30.36% 17	5.36% 3	32.14% 18	3.57% 2	56

SME Environmental Practices

Q13 Which of these statements do you agree with?

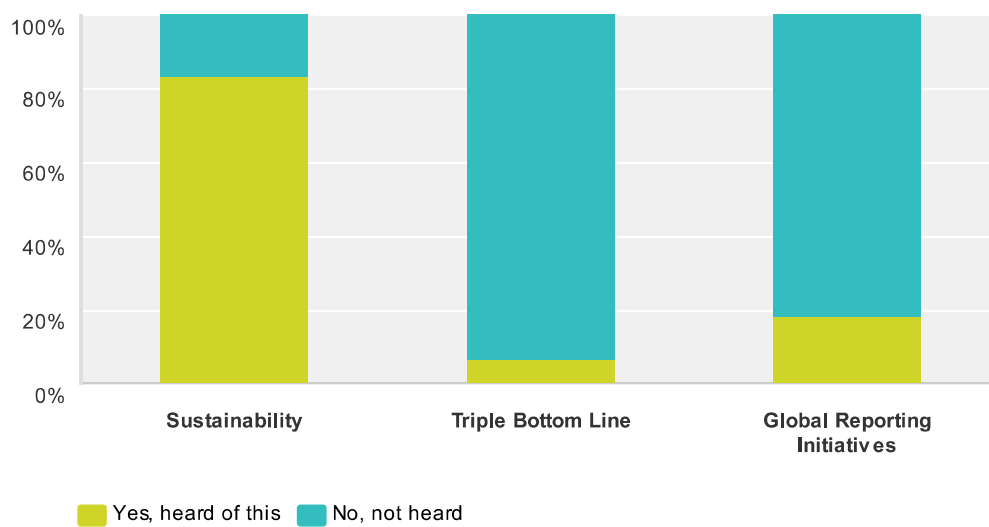
Answered: 60 Skipped: 0



	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Disagree	Do not Know	Total
Industrial activities are responsible for environmental degradation	53.85% 28	40.38% 21	0% 0	5.77% 3	0% 0	52
SMEs do not have a significant impact on the environment	12.50% 7	19.64% 11	19.64% 11	39.29% 22	8.93% 5	56

Q14 Which of these following terms have you heard of?

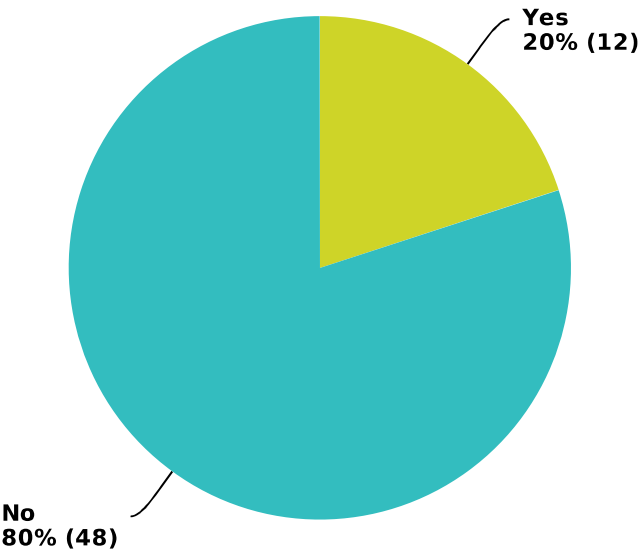
Answered: 60 Skipped: 0



	Yes, heard of this	No, not heard	Total
Sustainability	83.33% 50	16.67% 10	60
Triple Bottom Line	6.90% 4	93.10% 54	58
Global Reporting Initiatives	18.33% 11	81.67% 49	60

Q15 In the last one year, have you attended any training, conference or seminar on the Environment?

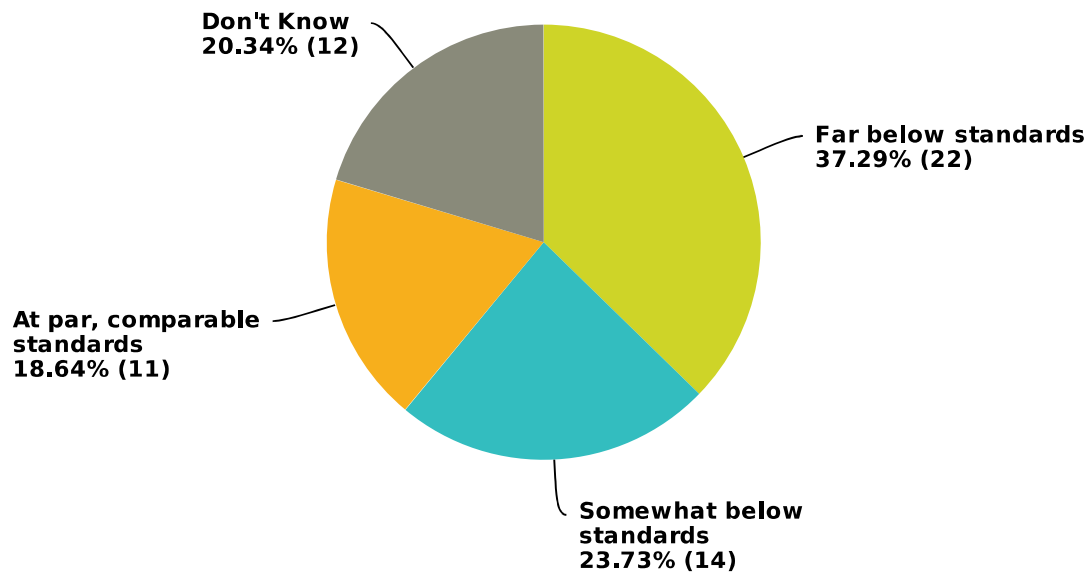
Answered: 60 Skipped: 0



Answer Choices	Responses	
Yes	20%	12
No	80%	48
Total		60

Q16 How do the Indian Environmental rules and regulations compare with that of advanced countries?

Answered: 59 Skipped: 1

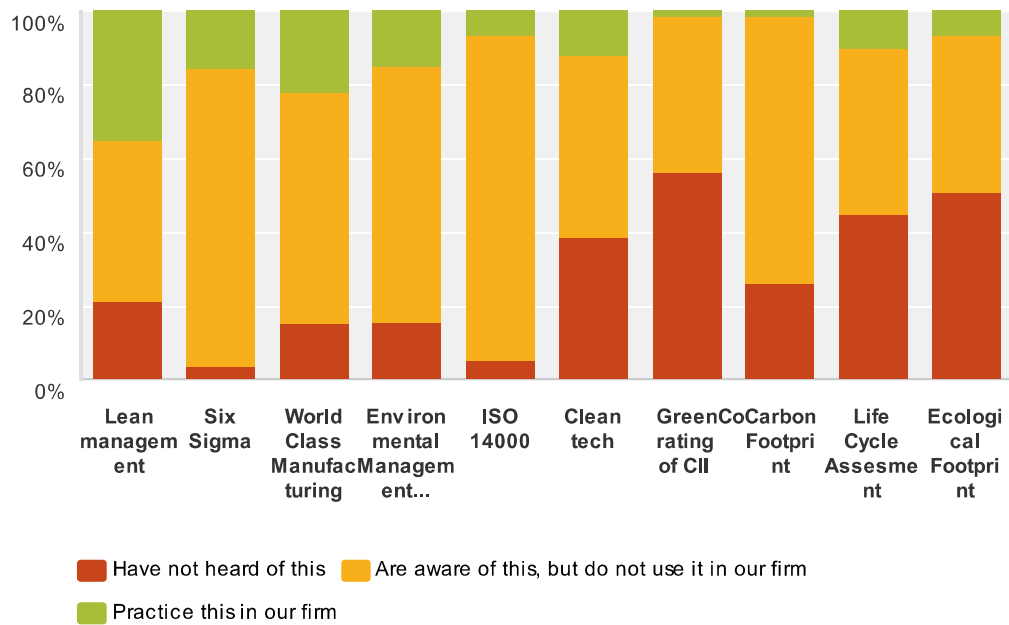


Answer Choices	Responses	
Far below standards	37.29%	22
Somewhat below standards	23.73%	14
At par, comparable standards	18.64%	11
Somewhat better	0%	0
Far better	0%	0
Don't Know	20.34%	12
Total		59

SME Environmental Practices

Q17 Which of these business practices would you

Answered: 59 Skipped: 1

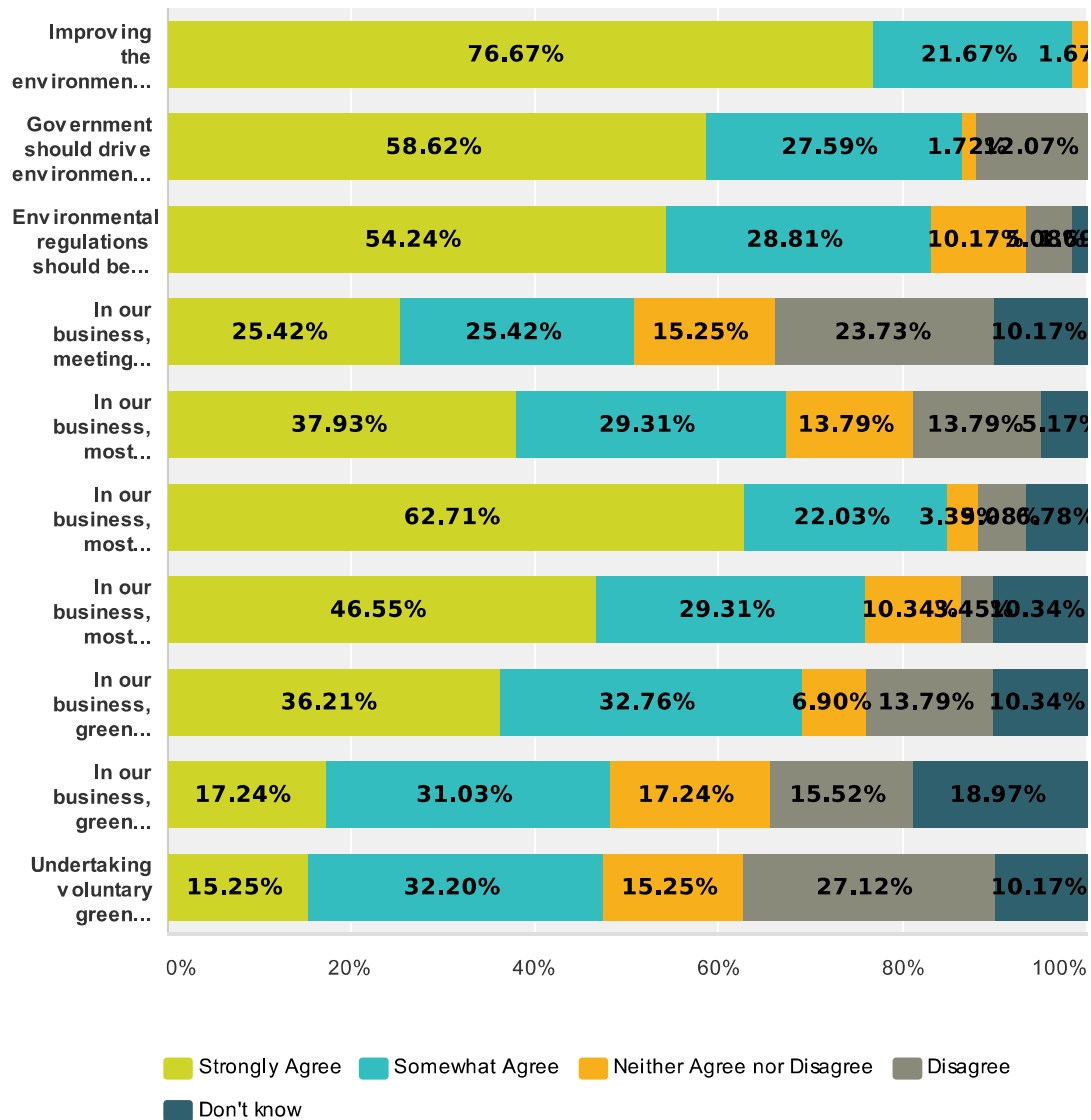


	Have not heard of this	Are aware of this, but do not use it in our firm	Practice this in our firm	Total
Lean management	21.05% 12	43.86% 25	35.09% 20	57
Six Sigma	3.51% 2	80.70% 46	15.79% 9	57
World Class Manufacturing	15.25% 9	62.71% 37	22.03% 13	59
Environmental Management Systems	15.52% 9	68.97% 40	15.52% 9	58
ISO 14000	5.26% 3	87.72% 50	7.02% 4	57
Clean tech	38.60% 22	49.12% 28	12.28% 7	57
GreenCo rating of CII	56.14% 32	42.11% 24	1.75% 1	57
Carbon Footprint	26.32% 15	71.93% 41	1.75% 1	57
Life Cycle Assessment	44.83% 26	44.83% 26	10.34% 6	58
Ecological Footprint	50.88% 29	42.11% 24	7.02% 4	57

SME Environmental Practices

Q18 Please check the option which best describes the following:

Answered: 60 Skipped: 0



	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Disagree	Don't know	Total
Improving the environmental performance should be the responsibility of every business	76.67% 46	21.67% 13	1.67% 1	0% 0	0% 0	60
Government should drive environmental performance of industries	58.62% 34	27.59% 16	1.72% 1	12.07% 7	0% 0	58
Environmental regulations should be tailored for the SME sector	54.24% 32	28.81% 17	10.17% 6	5.08% 3	1.69% 1	59
In our business, meeting environmental regulations is expensive	25.42% 15	25.42% 15	15.25% 9	23.73% 14	10.17% 6	59
In our business, most customers are not concerned about our environmental performance	37.93% 22	29.31% 17	13.79% 8	13.79% 8	5.17% 3	58
In our business, most customers would not pay more for green products or practices	62.71% 37	22.03% 13	3.39% 2	5.08% 3	6.78% 4	59

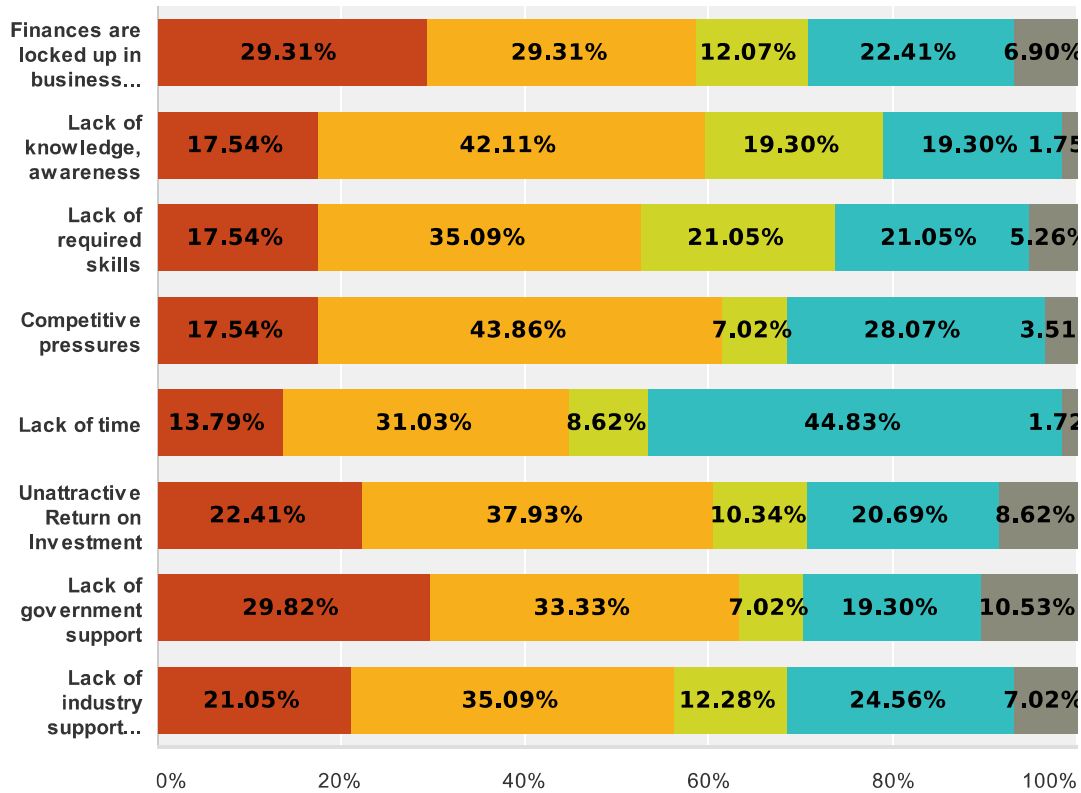
SME Environmental Practices

In our business, most competitors do not strictly comply with environmental regulations	46.55% 27	29.31% 17	10.34% 6	3.45% 2	10.34% 6	58
In our business, green practices add costs	36.21% 21	32.76% 19	6.90% 4	13.79% 8	10.34% 6	58
In our business, green practices add costs but also result in savings	17.24% 10	31.03% 18	17.24% 10	15.52% 9	18.97% 11	58
Undertaking voluntary green practices could negatively affect our cost competitiveness	15.25% 9	32.20% 19	15.25% 9	27.12% 16	10.17% 6	59

SME Environmental Practices

Q19 In your business, which factors are responsible for holding you back from Green Practices?

Answered: 58 Skipped: 2

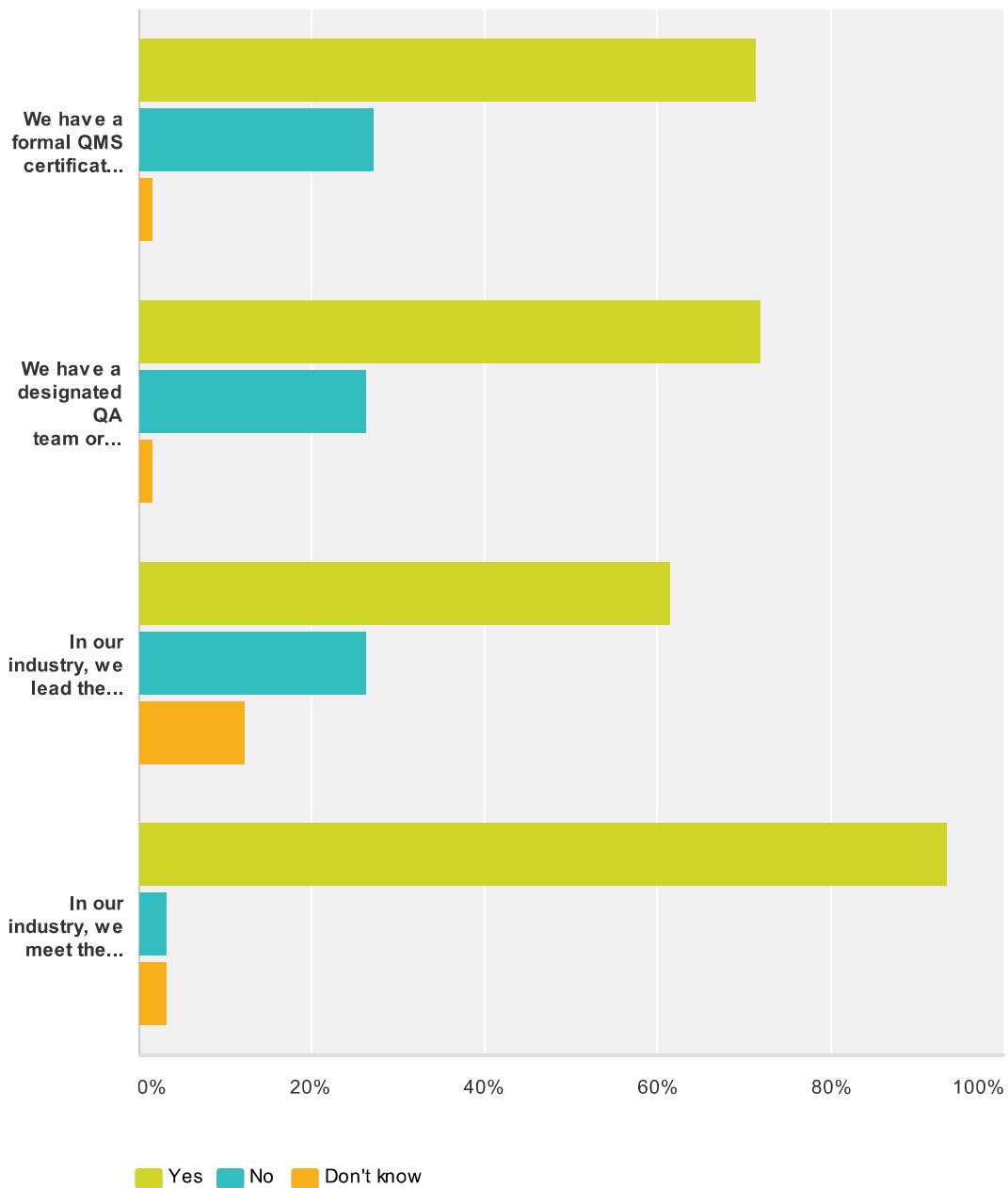


■ Strongly responsible
 ■ Somewhat responsible
 ■ May have been responsible
 ■ Not responsible
 ■ Do not know

	Strongly responsible	Somewhat responsible	May have been responsible	Not responsible	Do not know	Total
Finances are locked up in business activities	29.31% 17	29.31% 17	12.07% 7	22.41% 13	6.90% 4	58
Lack of knowledge, awareness	17.54% 10	42.11% 24	19.30% 11	19.30% 11	1.75% 1	57
Lack of required skills	17.54% 10	35.09% 20	21.05% 12	21.05% 12	5.26% 3	57
Competitive pressures	17.54% 10	43.86% 25	7.02% 4	28.07% 16	3.51% 2	57
Lack of time	13.79% 8	31.03% 18	8.62% 5	44.83% 26	1.72% 1	58
Unattractive Return on Investment	22.41% 13	37.93% 22	10.34% 6	20.69% 12	8.62% 5	58
Lack of government support	29.82% 17	33.33% 19	7.02% 4	19.30% 11	10.53% 6	57
Lack of industry support (associations)	21.05% 12	35.09% 20	12.28% 7	24.56% 14	7.02% 4	57

Q20 Which of these best describes the Quality Management practice of your firm?

Answered: 60 Skipped: 0

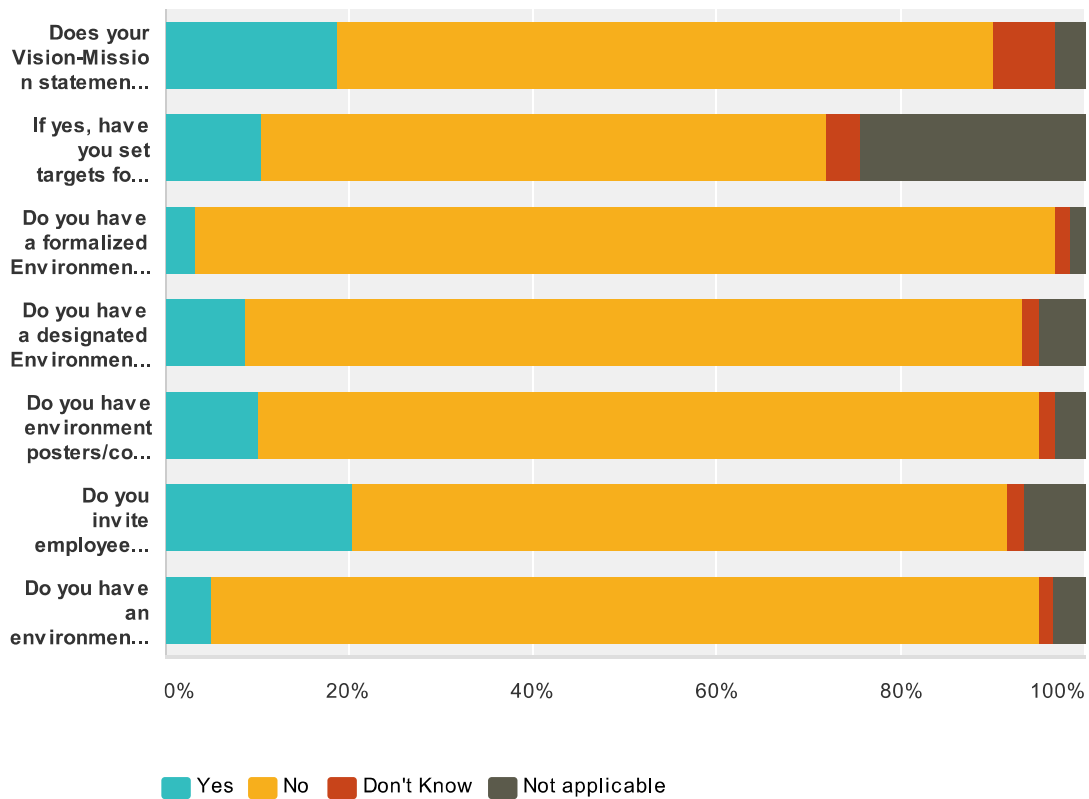


	Yes	No	Don't know	Total
We have a formal QMS certification (ISO)	71.19% 42	27.12% 16	1.69% 1	59
We have a designated QA team or individual	71.93% 41	26.32% 15	1.75% 1	57
In our industry, we lead the quality standards	61.40% 35	26.32% 15	12.28% 7	57
In our industry, we meet the quality requirements	93.22% 55	3.39% 2	3.39% 2	59

SME Environmental Practices

Q21 Please choose the appropriate option

Answered: 60 Skipped: 0

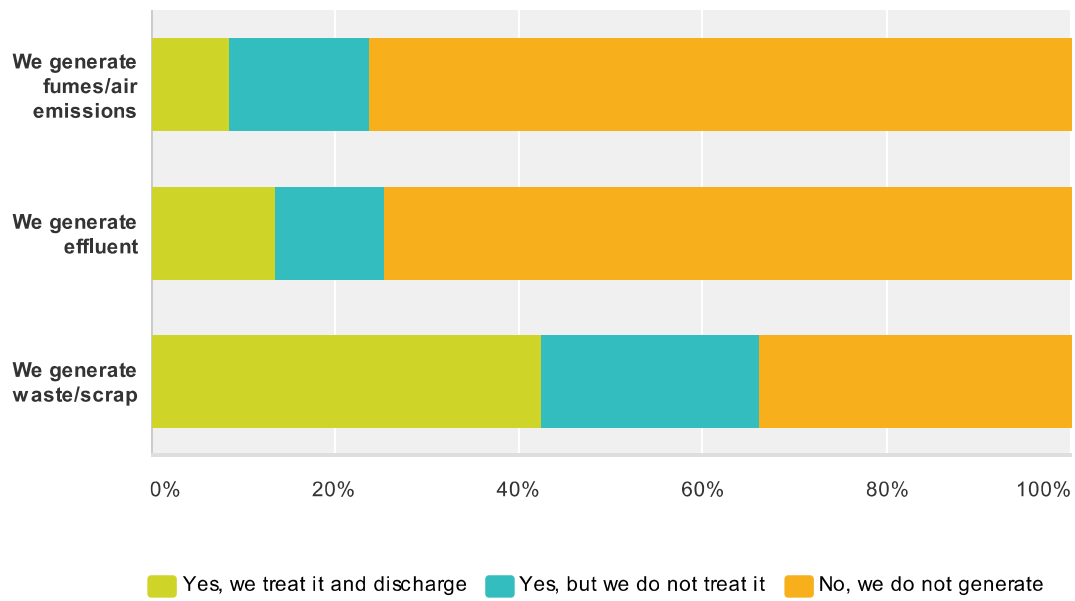


	Yes	No	Don't Know	Not applicable	Total
Does your Vision-Mission statement mention the environment?	18.64% 11	71.19% 42	6.78% 4	3.39% 2	59
If yes, have you set targets for environmental performance?	10.53% 6	61.40% 35	3.51% 2	24.56% 14	57
Do you have a formalized Environmental Management System? (ISO 14000)	3.39% 2	93.22% 55	1.69% 1	1.69% 1	59
Do you have a designated Environment Officer?	8.62% 5	84.48% 49	1.72% 1	5.17% 3	58
Do you have environment posters/communication displayed?	10.17% 6	84.75% 50	1.69% 1	3.39% 2	59
Do you invite employee suggestions for environmental improvements?	20.34% 12	71.19% 42	1.69% 1	6.78% 4	59
Do you have an environmental consultant?	5.17% 3	89.66% 52	1.72% 1	3.45% 2	58

SME Environmental Practices

Q22 Please select the right option

Answered: 59 Skipped: 1

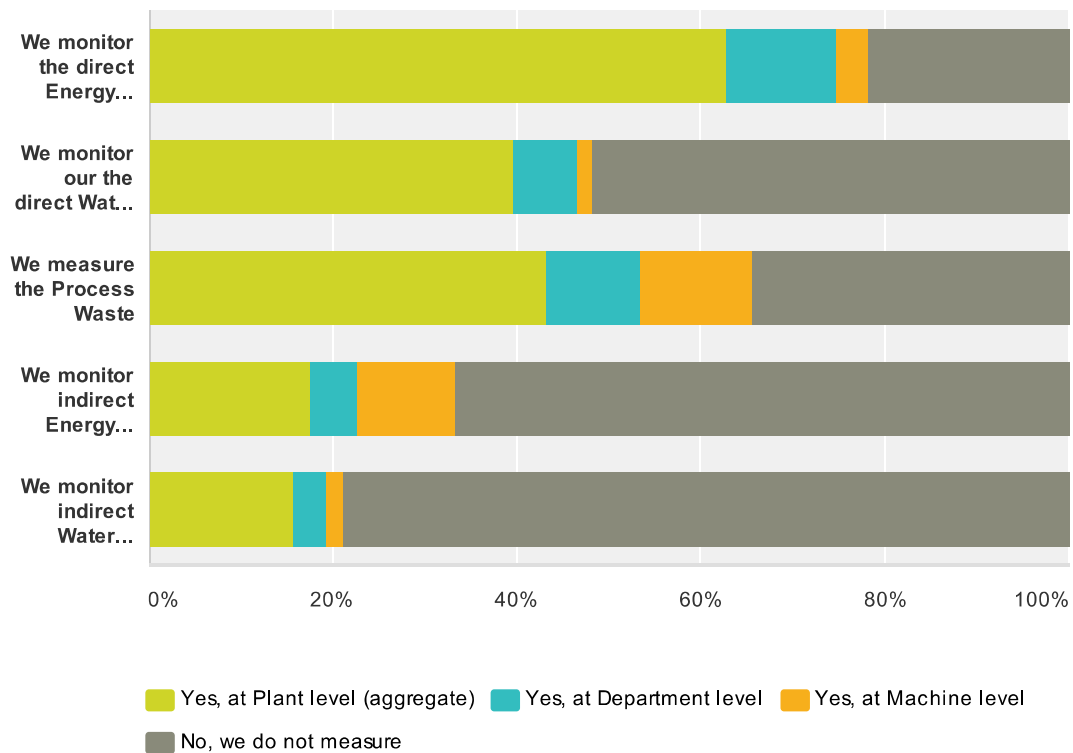


	Yes, we treat it and discharge	Yes, but we do not treat it	No, we do not generate	Total
We generate fumes/air emissions	8.47% 5	15.25% 9	76.27% 45	59
We generate effluent	13.56% 8	11.86% 7	74.58% 44	59
We generate waste/scrap	42.37% 25	23.73% 14	33.90% 20	59

SME Environmental Practices

Q23 Please select the option which represents your firm's practice

Answered: 59 Skipped: 1

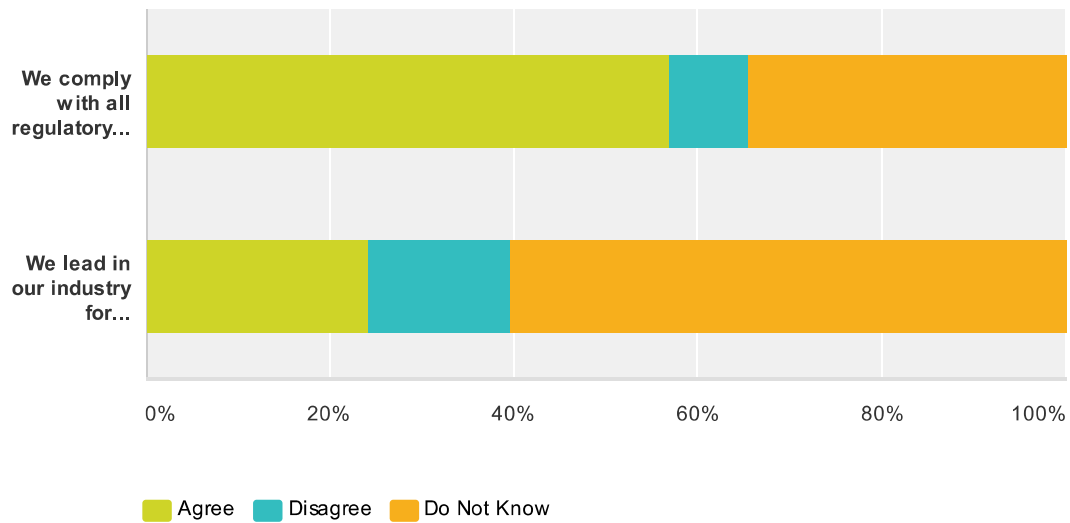


	Yes, at Plant level (aggregate)	Yes, at Department level	Yes, at Machine level	No, we do not measure	Total
We monitor the direct Energy consumption	62.71% 37	11.86% 7	3.39% 2	22.03% 13	59
We monitor our the direct Water consumption	39.66% 23	6.90% 4	1.72% 1	51.72% 30	58
We measure the Process Waste	43.10% 25	10.34% 6	12.07% 7	34.48% 20	58
We monitor indirect Energy consumption	17.54% 10	5.26% 3	10.53% 6	66.67% 38	57
We monitor indirect Water consumption	15.79% 9	3.51% 2	1.75% 1	78.95% 45	57

SME Environmental Practices

Q24 Choose the option which best describes the Environmental Management in your firm

Answered: 58 Skipped: 2

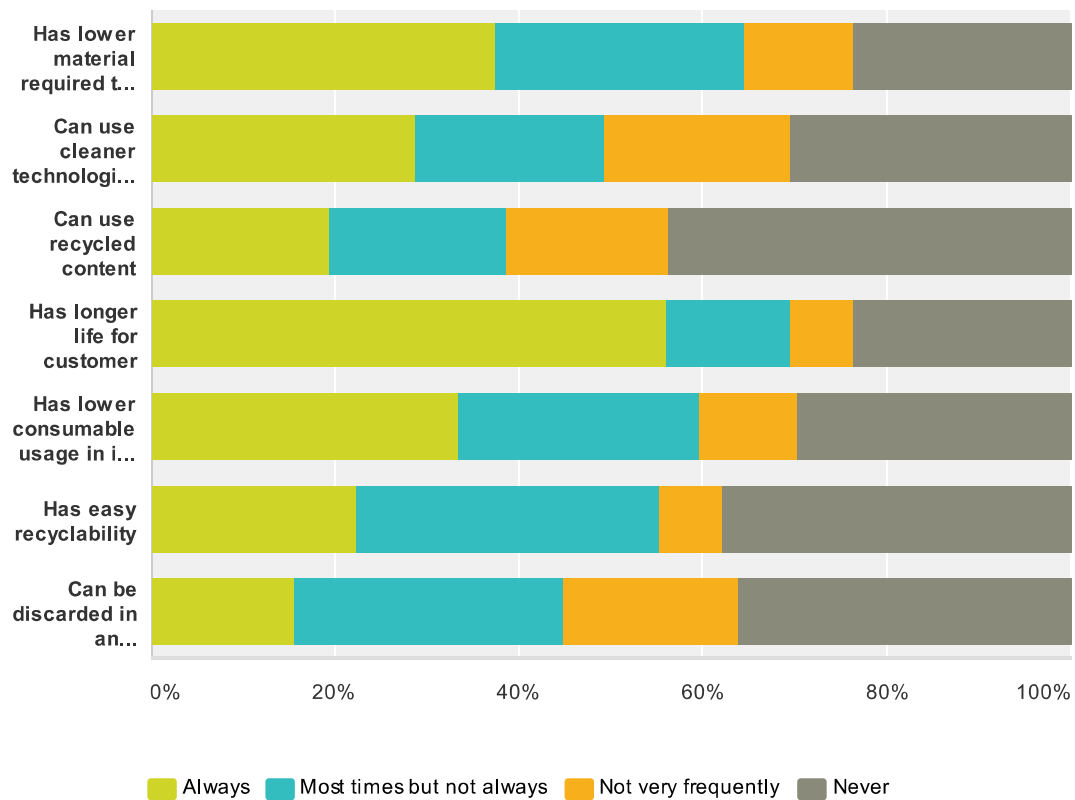


	Agree	Disagree	Do Not Know	Total
We comply with all regulatory standards (Air, water, discharge)	56.90% 33	8.62% 5	34.48% 20	58
We lead in our industry for regulatory compliance	24.14% 14	15.52% 9	60.34% 35	58

SME Environmental Practices

Q25 During product design, we check for environmental aspects so that the product

Answered: 59 Skipped: 1

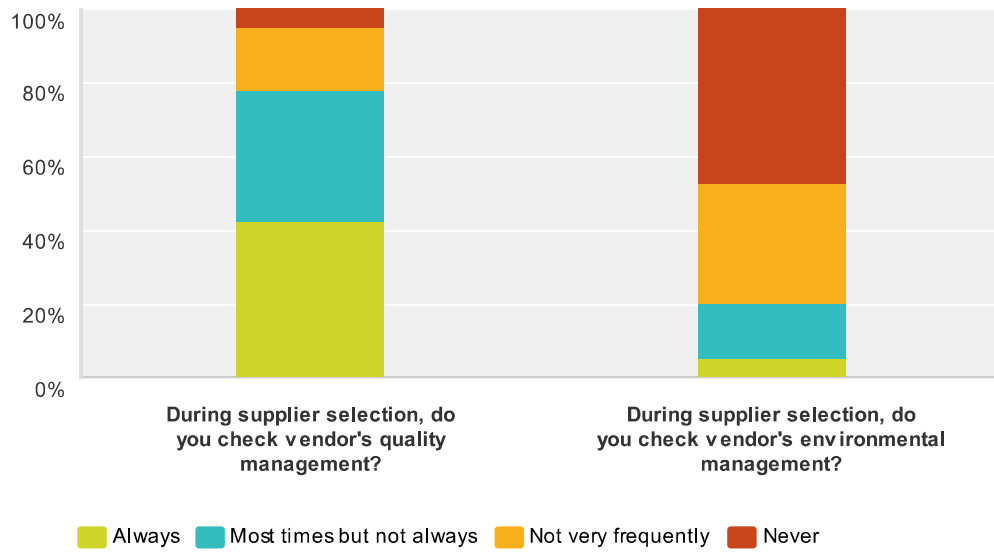


	Always	Most times but not always	Not very frequently	Never	Total
Has lower material required to make it	37.29% 22	27.12% 16	11.86% 7	23.73% 14	59
Can use cleaner technologies in production	28.81% 17	20.34% 12	20.34% 12	30.51% 18	59
Can use recycled content	19.30% 11	19.30% 11	17.54% 10	43.86% 25	57
Has longer life for customer	55.93% 33	13.56% 8	6.78% 4	23.73% 14	59
Has lower consumable usage in its use	33.33% 19	26.32% 15	10.53% 6	29.82% 17	57
Has easy recyclability	22.41% 13	32.76% 19	6.90% 4	37.93% 22	58
Can be discarded in an environmentally friendly way	15.52% 9	29.31% 17	18.97% 11	36.21% 21	58

SME Environmental Practices

Q26 Check the option which best describes your firm's activities

Answered: 59 Skipped: 1

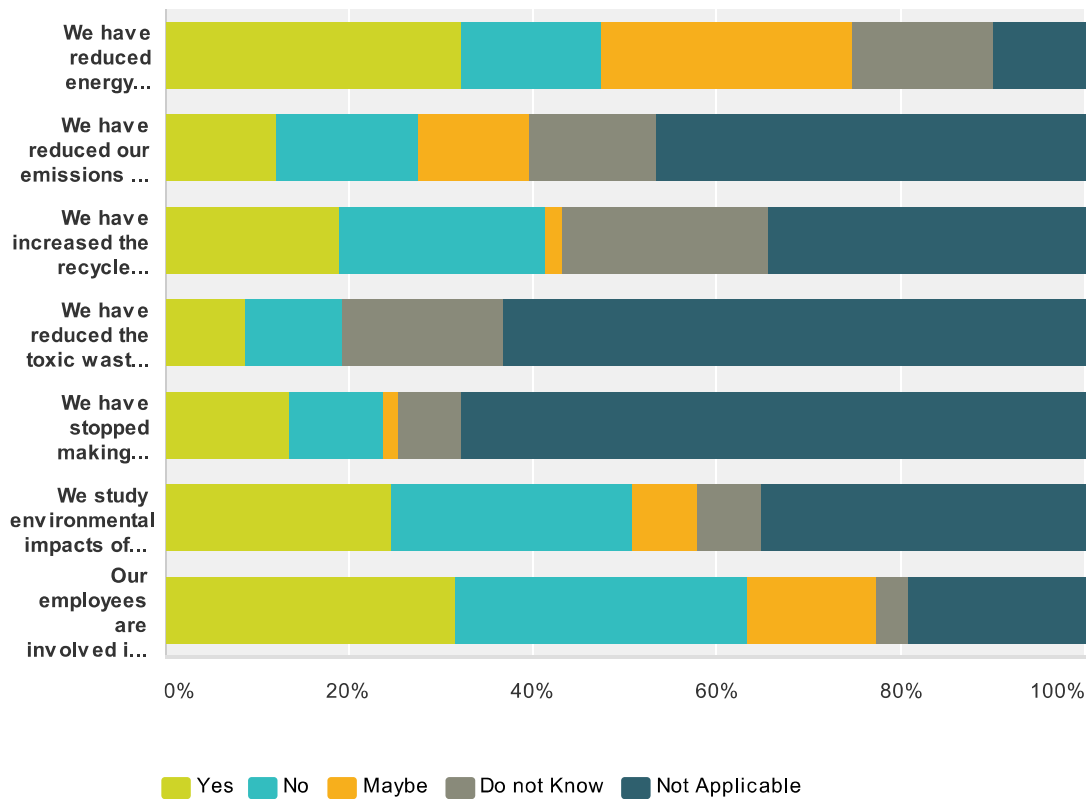


	Always	Most times but not always	Not very frequently	Never	Total
During supplier selection, do you check vendor's quality management?	42.37% 25	35.59% 21	16.95% 10	5.08% 3	59
During supplier selection, do you check vendor's environmental management?	5.08% 3	15.25% 9	32.20% 19	47.46% 28	59

SME Environmental Practices

Q27 In the last 2 years,

Answered: 59 Skipped: 1

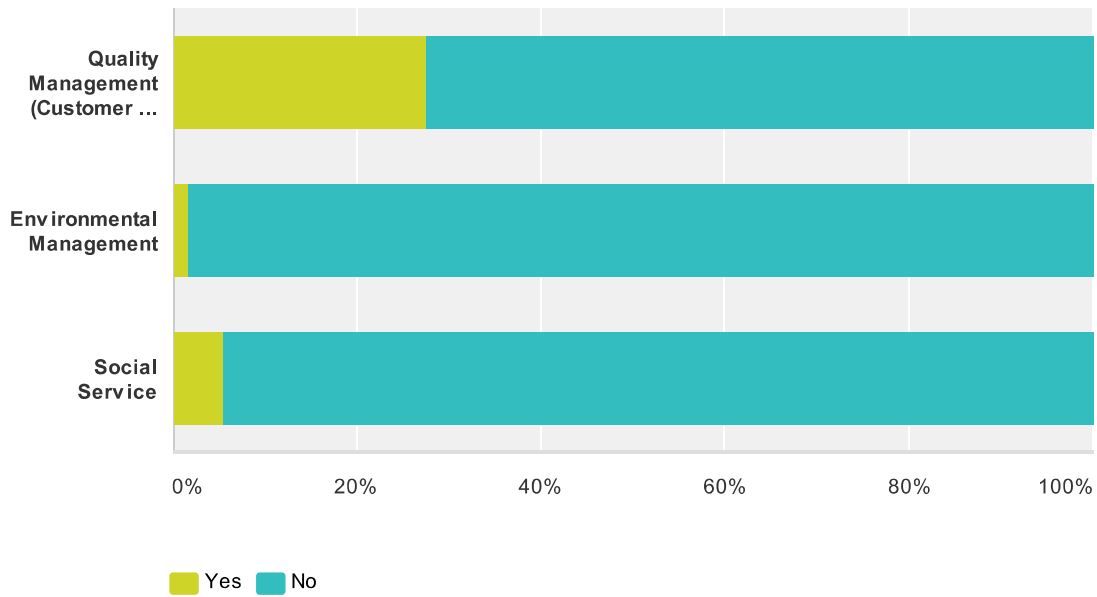


	Yes	No	Maybe	Do not Know	Not Applicable	Total
We have reduced energy consumed per unit manufactured	32.20% 19	15.25% 9	27.12% 16	15.25% 9	10.17% 6	59
We have reduced our emissions per unit manufactured	12.07% 7	15.52% 9	12.07% 7	13.79% 8	46.55% 27	58
We have increased the recycle content per unit manufactured	18.97% 11	22.41% 13	1.72% 1	22.41% 13	34.48% 20	58
We have reduced the toxic waste generated	8.77% 5	10.53% 6	0% 0	17.54% 10	63.16% 36	57
We have stopped making products which were environmentally harmful	13.56% 8	10.17% 6	1.69% 1	6.78% 4	67.80% 40	59
We study environmental impacts of products in design stage	24.56% 14	26.32% 15	7.02% 4	7.02% 4	35.09% 20	57
Our employees are involved in environmental awareness	31.58% 18	31.58% 18	14.04% 8	3.51% 2	19.30% 11	57

SME Environmental Practices

Q28 In the last 2 years, have you won any award for

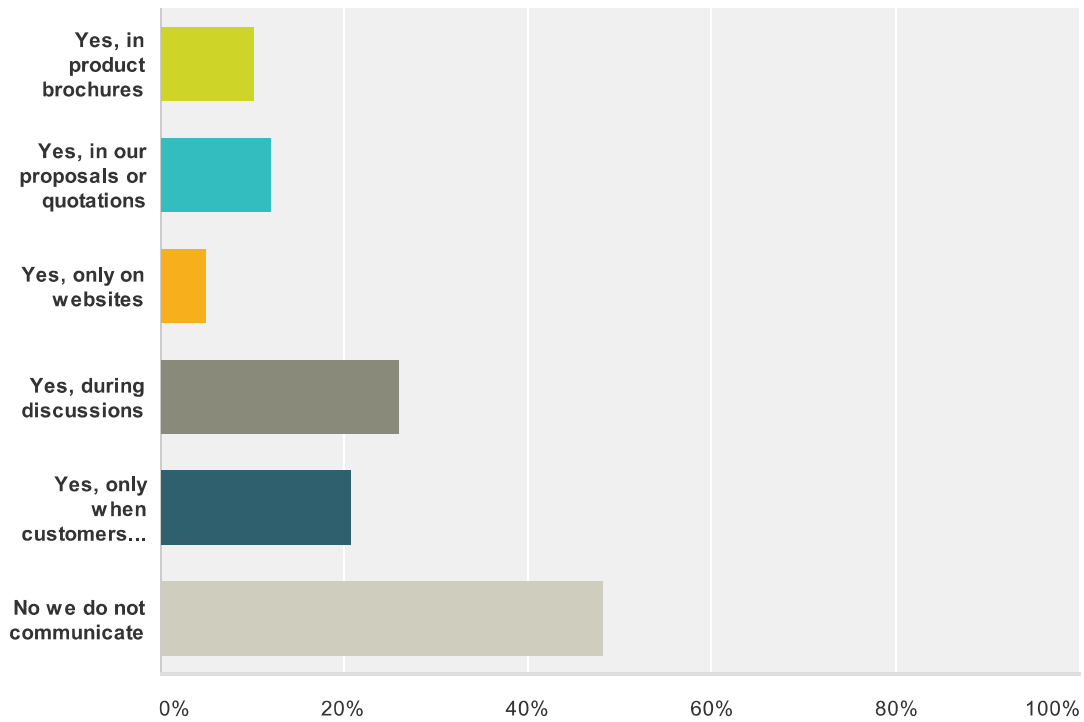
Answered: 58 Skipped: 2



	Yes	No	Total
Quality Management (Customer or Association)	27.59% 16	72.41% 42	58
Environmental Management	1.75% 1	98.25% 56	57
Social Service	5.45% 3	94.55% 52	55

Q29 Do you communicate your Environmental efforts to Customers?

Answered: 58 Skipped: 2

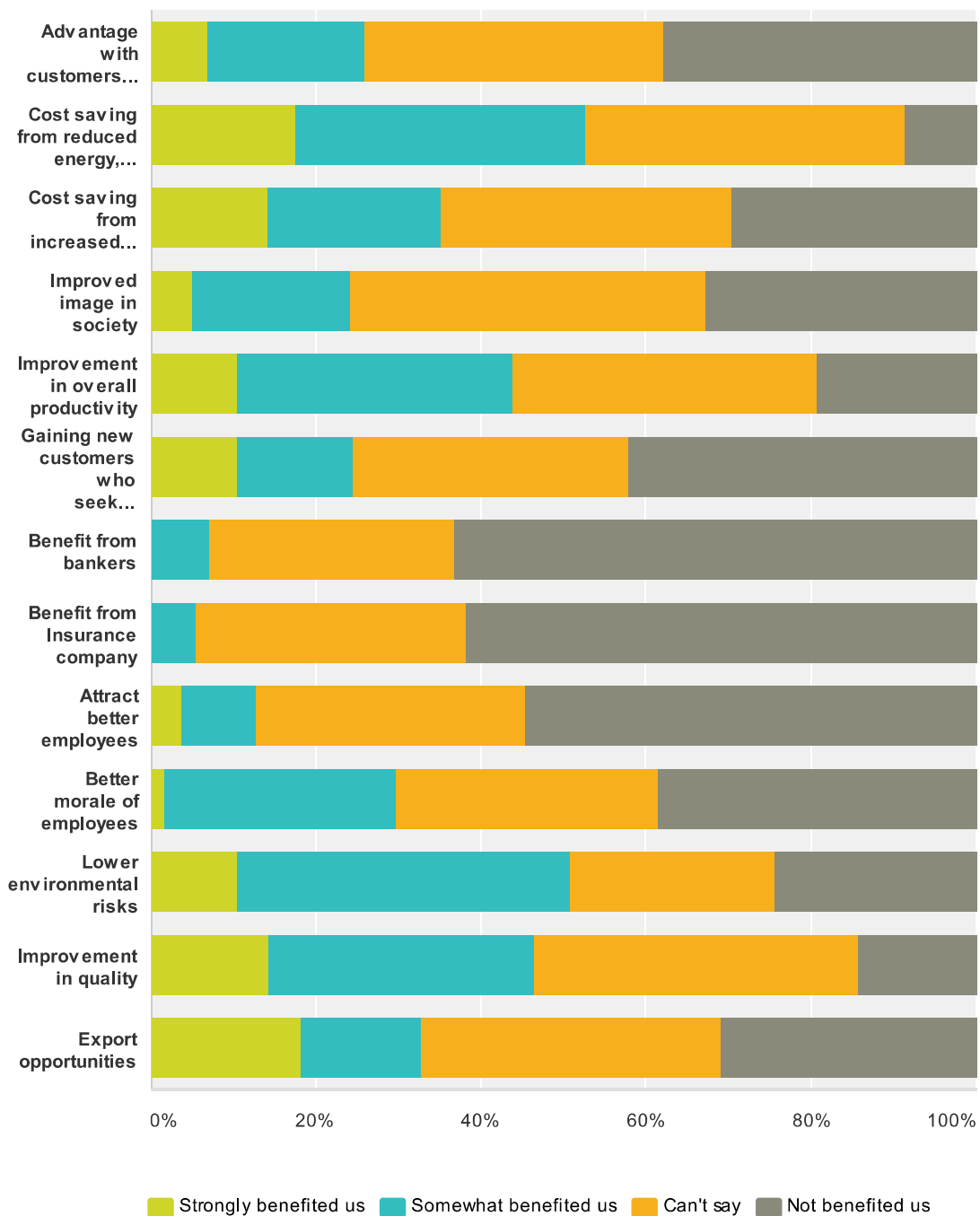


Answer Choices	Responses	
Yes, in product brochures	10.34%	6
Yes, in our proposals or quotations	12.07%	7
Yes, only on websites	5.17%	3
Yes, during discussions	25.86%	15
Yes, only when customers asks for	20.69%	12
No we do not communicate	48.28%	28
Total Respondents: 58		

SME Environmental Practices

Q30 From the environmental performance of your firm, which of these benefits have you observed?

Answered: 59 Skipped: 1



	Strongly benefited us	Somewhat benefited us	Can't say	Not benefited us	Total
Advantage with customers during negotiations	6.90% 4	18.97% 11	36.21% 21	37.93% 22	58
Cost saving from reduced energy, material or waste	17.54% 10	35.09% 20	38.60% 22	8.77% 5	57
Cost saving from increased recycled content	14.04% 8	21.05% 12	35.09% 20	29.82% 17	57

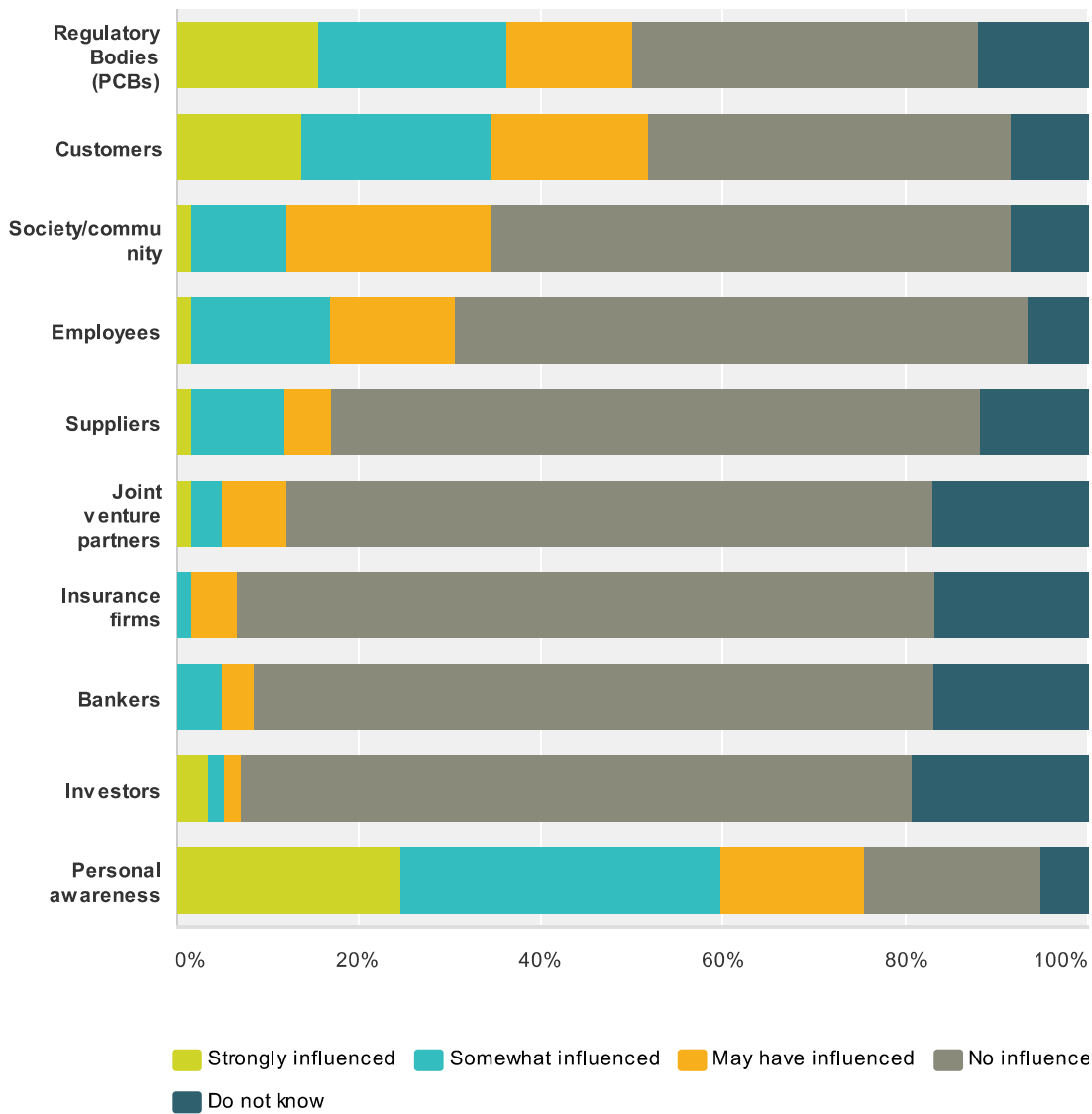
SME Environmental Practices

Improved image in society	5.17% 3	18.97% 11	43.10% 25	32.76% 19	58
Improvement in overall productivity	10.53% 6	33.33% 19	36.84% 21	19.30% 11	57
Gaining new customers who seek environmental performance standards	10.53% 6	14.04% 8	33.33% 19	42.11% 24	57
Benefit from bankers	0% 0	7.02% 4	29.82% 17	63.16% 36	57
Benefit from Insurance company	0% 0	5.45% 3	32.73% 18	61.82% 34	55
Attract better employees	3.64% 2	9.09% 5	32.73% 18	54.55% 30	55
Better morale of employees	1.75% 1	28.07% 16	31.58% 18	38.60% 22	57
Lower environmental risks	10.53% 6	40.35% 23	24.56% 14	24.56% 14	57
Improvement in quality	14.29% 8	32.14% 18	39.29% 22	14.29% 8	56
Export opportunities	18.18% 10	14.55% 8	36.36% 20	30.91% 17	55

SME Environmental Practices

Q31 In the last one year, which of these has influenced your Environmental Performance?

Answered: 59 Skipped: 1



	Strongly influenced	Somewhat influenced	May have influenced	No influence	Do not know	Total
Regulatory Bodies (PCBs)	15.52% 9	20.69% 12	13.79% 8	37.93% 22	12.07% 7	58
Customers	13.79% 8	20.69% 12	17.24% 10	39.66% 23	8.62% 5	58
Society/community	1.72% 1	10.34% 6	22.41% 13	56.90% 33	8.62% 5	58
Employees	1.69% 1	15.25% 9	13.56% 8	62.71% 37	6.78% 4	59
Suppliers	1.69% 1	10.17% 6	5.08% 3	71.19% 42	11.86% 7	59
Joint venture partners	1.72% 1	3.45% 2	6.90% 4	70.69% 41	17.24% 10	58
Insurance firms	0% 0	1.69% 1	5.08% 3	76.27% 45	16.95% 10	59

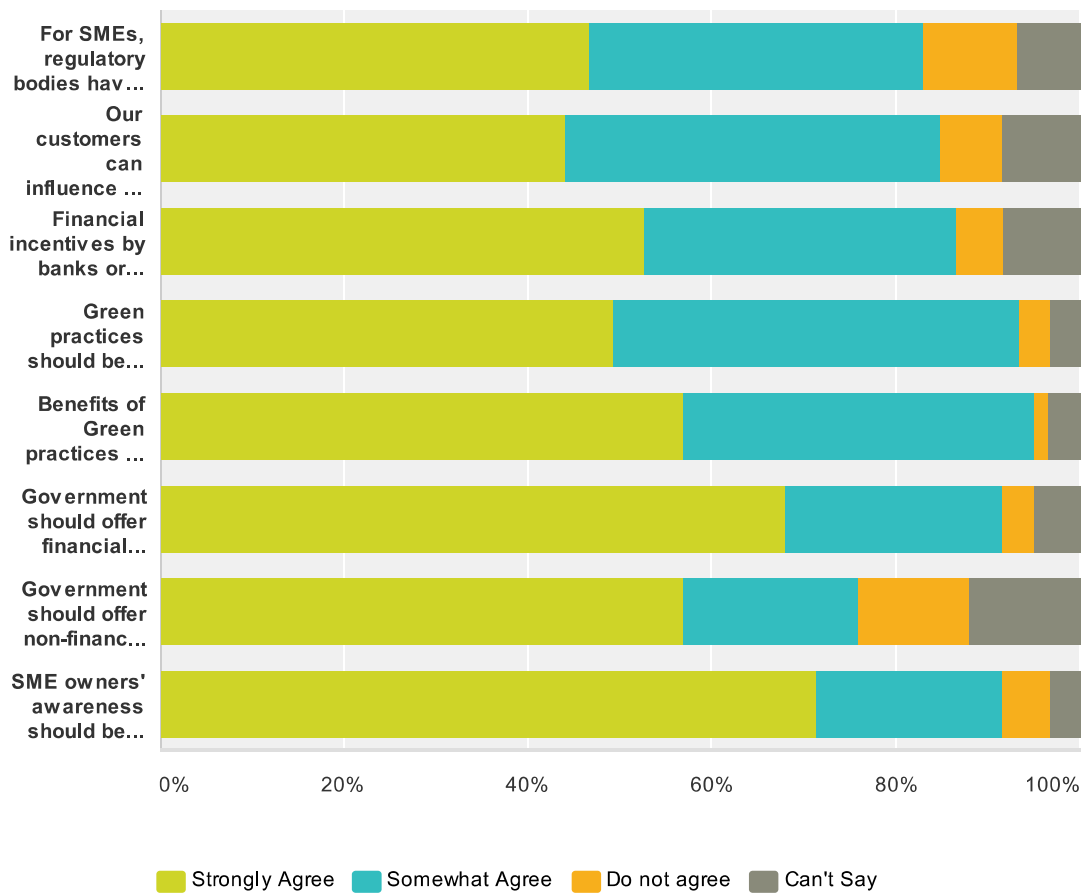
SME Environmental Practices

Insurance firms	0	1	3	45	10	59
Bankers	0%	5.08%	3.39%	74.58%	16.95%	59
	0	3	2	44	10	
Investors	3.51%	1.75%	1.75%	73.68%	19.30%	57
	2	1	1	42	11	
Personal awareness	24.56%	35.09%	15.79%	19.30%	5.26%	57
	14	20	9	11	3	

SME Environmental Practices

Q32 Which of these statements do you agree?

Answered: 59 Skipped: 1



	Strongly Agree	Somewhat Agree	Do not agree	Can't Say	Total
For SMEs, regulatory bodies have the most important role	46.55% 27	36.21% 21	10.34% 6	6.90% 4	58
Our customers can influence us to improve our Environmental performance	44.07% 26	40.68% 24	6.78% 4	8.47% 5	59
Financial incentives by banks or insurance firms can help SMEs prioritize environmental issues	52.54% 31	33.90% 20	5.08% 3	8.47% 5	59
Green practices should be shared for SMEs	49.15% 29	44.07% 26	3.39% 2	3.39% 2	59
Benefits of Green practices are not easily understood by SMEs	56.90% 33	37.93% 22	1.72% 1	3.45% 2	58
Government should offer financial incentives for SMEs to improve Green Performance	67.80% 40	23.73% 14	3.39% 2	5.08% 3	59
Government should offer non-financial incentives for SMEs to improve Green Performance	56.90% 33	18.97% 11	12.07% 7	12.07% 7	58
SME owners' awareness should be improved	71.19% 42	20.34% 12	5.08% 3	3.39% 2	59

Annexure 3

List of research Publications of the researcher

No.	Title of paper	Journal & Publisher	Volume, Page numbers and Year
1	Greening engineering SMEs in India	Book Chapter for : Corporate Sustainability : South Asian Perspective Greenleaf Publishing, UK	In Press. Release by December 2014.
2	Greening in the Product Life Cycle: A Study with Engineering Small- and Medium-Sized Enterprises	Sustainability : The Journal of Record Mary Ann Liebert Inc, USA	In Press for the August 2014 issue
3	Does environmental sustainability matter to small and medium enterprises? Empirical evidence from India	International Journal of Environmental Studies. Taylor & Francis, Routledge UK	2014
4	Sustainability in Emerging Markets: Evidence from India	Sustainability : The Journal of Record Mary Ann Liebert Inc, USA	7 (2), 109:115 1 2014
5	SMEs and Environmental Performance– A Framework for Green Business Strategies	Procedia-Social and Behavioral Sciences. Elsevier, UK	133: 130-140 2014