

# Environment Management Systems in Indian Small and Medium-Sized Enterprises

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## ABSTRACT

This paper investigates the challenges small and medium-sized enterprises (SMEs) face in India with regards to their generally poor environmental management track record. In this context, the paper explores the status and effectiveness of Environmental Management Systems (EMSs) as a means of improving the environmental management performance of Indian SMEs as well as the applicability of the formal uptake of ISO 14001 (uncertified or certified). Indian SMEs are responsible for producing large amounts of waste affecting environmental quality but also firms' international reputation in environmentally sensitive markets. While national policies support the greening of medium size enterprises (MSEs) by way of reimbursing firms 75 per cent of the cost of ISO 14001 certification, businesses are not supported with the cost for "continuous improvement", which is a major barrier for Indian SMEs when implementing and building up an EMS. This paper is informed by a detailed review of international research on the SME experience with EMSs, examining whether EMS uptake can help SMEs not only improve their environmental performance but also assist in terms of becoming internationally competitive and gaining access to global export markets. This paper points to a need of a country-specific and sector-specific investigation of the relationship between small firms' EMS uptake and their environmental management performance, based on an analysis of the international EMS experience and the status of EMS in Indian SMEs. Such a research agenda also ought to address the question of relevance and applicability of formal standards such as the ISO 14001 to the Indian context.

**Key Words:** SME, EMS, ISO 14001, Waste minimization

## INTRODUCTION

The Final Report Fourth all India Census of MSME 2006-2007 Book reveals that there are 26.1 million SMEs in India; 7.3 million in manufacturing and 18.8 million in the service sector with overall around 59.7 million people employed in SMEs (DCMSME, 2009). There was no official definition of SMEs prior to the establishment of the Ministry of Micro, Small and Medium Enterprises (MSME) in 1999, and the subsequent release of the MSME Development Act in 2006 (see Table 1). Previously, SMEs fell under the Ministry of Small Scale Industries Agro and Rural Industries (SSI & ARI). In 2012, Small & Medium Business Development Chamber of India reported that there are approximately 30 million MSME Units. The Indian market is said to be growing rapidly, and Indian entrepreneurs are making remarkable progress in various industries like manufacturing, precision engineering design and food processing as well as pharmaceutical, textile and garments, retail, IT and ITES (Small & Medium Business Development Chamber of India). The growth of Indian SMEs is economically significant, yet their environmental impact is also immense, affecting environmental quality as well as their global competitiveness with recent rise in product seizures in European Union (Das and Pradhan, 2010). According to the Ministry of Environment and Forests (MOEF) 70% of the industrial pollution of the whole nation is due to SMEs (DCSME, 2009). As a means of countering their negative environmental image of Indian firms, SMEs have started developing and implementing both formal and informal EMSs. Looking at this problem and the growing participation of Indian SMEs in global value chains, the Indian government as part of 11<sup>th</sup> plan have encouraged ISO 9000/14001 Certification Fee Reimbursement Scheme to enhance the competitive strength of the MSEs (Medium-sized enterprises), where by 75% of the fees, to a maximum of Rs.75, 000 (\$2000), for acquiring environment management system (EMS)/ISO 14001 certification by the Medium and small entrepreneurs. Environmental performance can actually be competitive and promote innovation. EMS helps in getting economic benefit, increased environmental performance and legal compliance.

Even though ISO 14001 certification is growing among Indian firms due to the government's reimbursement scheme, overall EMS uptake remains relatively weak when compared to the growth in uptake in China which records the world's highest growth in ISO 14001 certification (ISO survey, 2010).

The Second Edition of the NSF International manual (2001) defines EMS as a "a continual cycle of planning, implementing, reviewing and improving the processes and actions that an organization undertakes to meet its environmental obligations." ISO 14001 is the most widely accepted environmental management standard, used by both large and small companies world-wide. However small businesses find the ISO uptake challenging which in turn explains more limited small business participation (Hillary, 2004).

This paper gives an overview of current status of EMS in India which is then compared to the international research on SMEs it proposes solution to overcome the key challenges that SMEs face due to their poor environmental performance. Also due to heterogeneous nature of SMEs it is difficult to generalize the environmental impacts and strategies of the sector. So the propositions from International experience must be tested in Indian context to appraise environmental performance of SMEs due to uptake of EMS/ISO 14001.

**Table-1 : DEFINITION OF MSMEs N INDIA (SMBDCI, 2012)**

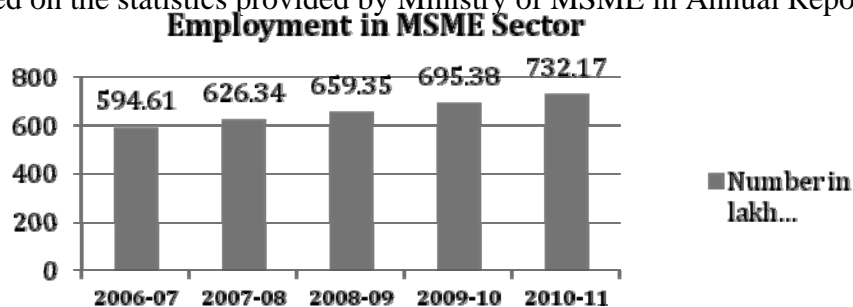
Manufacturing Enterprises – Investment in Plant & Machinery		
Description	INR/Rupees(Rs.)	USD(\$)
Micro Enterprises	up to Rs. 25Lakhs	up to \$ 62,500
Small Enterprises	aboveRs. 25 Lakhs & upto Rs. 5 Crores	above \$ 62,500 & upto \$ 1.25 million
Medium Enterprises	aboveRs. 5 Crores& upto Rs. 10 Crores	above \$ 1.25 million & upto \$ 2.5 million
Service Enterprises – Investment in Equipment		
Description	INR	USD(\$)
Micro Enterprises	upto Rs. 10Lakhs	upto \$ 25,000
Small Enterprises	aboveRs. 10 Lakhs & upto Rs. 2 Crores	above \$ 25,000 & upto \$ 0.5 million
Medium Enterprises	aboveRs. 2 Crores& upto Rs. 5 Crores	above \$ 0.5 million & upto \$ 1.5 million

## BACKGROUND OF THE STUDY

### ■ Significance of SMEs in India

Table [2] explains the contribution of the SME sector to the national economy with a constant growth rate of 10-13 per cent and its share in GDP. The MSME Sector accounts for about 45% of the manufacturing output and 40% of the total output of the country. 67.1% of MSMEs are engaged in manufacturing/assembling/processing and 32.9% are engaged in service activities (Annual-Report, 2010-11). Primarily, however, the sector is important to, and promoted by the Indian government because of its potential for employment generation (Fig-1).

**Figure 1:** Based on the statistics provided by Ministry of MSME in Annual Report(2011-12, 28)



**Table 2: PERFORMANCE OF MICRO & SMALL ENTERPRISES**

Year	Number of Enterprises (Lakh Nos.)			Empl. (Lakh Person)	Production (Rs. Crs.) at Current prices	Growth Rate (%)	Share In GDP (%)
	Registered	Unregistered	Total				
2002-2003	15.91	93.58	109.49	263.49	314850	8.68	5.92
2003-2004	16.97	96.98	113.95	275.30	364547	9.64	5.79
2004-2005	17.53	101.06	118.59	287.55	429796	10.88	5.84
2005-2006	18.71	104.71	123.42	299.85	497842	12.32	5.83
2006-2007 (Projected)	20.98	107.46	128.44	312.52	587196	12.65	5.94
2007-2008 (Projected)	24.68	108.99	133.67	322.28	695126	13.00	NA

**Source:**Office of the Development Commissioner, M/O Micro & Small Enterprises Cluster Development Programme(Statistics & Data Bank Division), 2012

### ■ Key Environmental Challenges

Today, SMEs face many challenges from various stakeholders (National and international Government, community, NGOs, Importers of their goods and services and others) to change their operational and strategic goals to deliver goods and services with lower environmental impact. Some of these key challenges are outlined below.

#### ● A Change in Entry-level Strategy for Potential Global Markets

Indian SMEs are in a state of transition adjusting to the pressures posed by globalization, Das and Pradhan (2010) identify, for example, the direct impact the economic slowdown of 2007 in major developed and developing economies had on foreign trade exposed Indian SMEs.. Many Indian SMEs are export-oriented and derive significant sales from foreign countries. SMEs contribute 35% of the total direct exports from India to mainly US markets followed by Germany, UK, Singapore, UAE and Saudi Arabia. This gives SMEs opportunity to explore international market but at the same time expose them to risks associated with international trade (Sharma, 2009). One of the major markets for Indian SMEs is the European Union (EU). European markets place emphasis on product quality, safety, manufacturing practices and corporate social responsibility (CSR), expectations that are also placed on firms exporting to Europe. Market expectations such as these affect Indian SMEs whose export performance declined in the early half

of the last decade (Das and Pradhan, 2010) in part because of their relatively poor environmental track record. Compounding, environmental performance pressures are likely to increase further as evidenced by calls within the EU to place tariffs on products from countries that do not abide by international targets on carbon emission reductions (Hollinger 2009) This illustrates that Indian SMEs are likely to further lose market share should they fail to devise more proactive environmental and manufacturing strategies (Martin-Tapia et al.,2008; Das and Pradhan, 2010). Devising environmental strategies, however, as highlighted by Gulati (2009), proves particularly difficult for SMEs who not only require sound environmental credentials to gain market access in places like Europe but also seek to attract foreign direct investments (FDI) and explore international markets through joint ventures (Malarvizhi and Yadav, 2008-2009).

● **Waste Minimization**

Due to the outdated technologies, pollution due to large and unplanned industrial conglomerations, existence of large number of small scale industries, poor enforcement of pollution control regulations and lack of resources, Indian SMEs are under pressure to minimize waste (Solid, water or gaseous) produced by their activities (Waste Minimisation in Small Scale Industries n.d ). As identified by Government of India, there are 17 industries that are most polluting as below in Table [3]. According to the Ministry of Environment and Forests (MOEF), SMEs account for 40 percent of industrial production, employ limited pollution control technologies and are responsible for an estimated 70 percent of the total industrial pollution load nationwide. The scope of waste management includes waste avoidance (as source), waste minimization, resource recovery and recycling, treatment (detoxification), disposal and cleanup. In India waste treatment and disposal facilities do not exist (Misra and Pandey,2005).

**Table 3: MOST POLLUTING INDUSTRIES** (as identified by Government of India)

1) Cement	2) Thermal power plants
3) Iron & Steel	4) Fertilizer
5) Zinc Smelters	6) Copper Smelters
7) Aluminium Smelters	8) Oil Refineries
9) Distilleries	10) Pulp & Paper
11) Dyes and Dye Intermediates	12) Pesticides
13) Dyes and Dye Intermediates	14) Petro Chemicals
15) Tanneries	16) Sugar and
17) Basic Drugs	

Misra and Pandey (2005) further reveals that levels of emission from incinerators (important for combustion of organic substances in waste) have not been monitored regularly and better technology is necessary to dispose organic wastes. They also have pointed out stockpile of banned or regulated pesticides and no monitoring of persistent toxic substances used in landfills. Misra and Pandey (2005) urge for developing waste reduction systems that will be simple and will not involve major change in the process or raw material. This is because any change in process or raw material will need expensive technology and qualified human resource and the waste reduction will no more be cost-effective.

● **Legal Compliance**

India’s environmental Laws are known to be more developed compared to those of other non-OECD countries. India’s Environment Protection Act (EPA), 1986 is the base for all environmental regulations. Under Section 6 and 25 of the EPA the Indian Government promulgated “The Environment Protection Rule 1986” which provides various provisions for controlling and abating environmental pollution. Also there are several notifications for an efficient Environment management System such as eco-labeling and Environmental impact assessment notifications. Some projects viz. Construction needs no objection or clearance from Government before starting their activities (Islam et al., 2001). In India there are pollution control boards at the state level and also at Center. As Indian SMEs are found to be heavy polluters, they frequently face law suits and are monitored by pollution control boards of the State and Center. One such case is of Ambuja Petrochemicals Vs. Andhra Pradesh Pollution Control Board (Kumar, 2010).

The case of Ambuja Petrochemicals vs. Andhra Pradesh Pollution Control Board (APPCB) in 1996 highlights the challenges that SMEs face in relation to legal compliance. The company was charged under the Water (prevention and control of Pollution) Act, 1974 which prohibits the discharge of pollutants into water bodies beyond a given standard, and lays down penalties for noncompliance (Kumar, 2010). The High Court of India ruled that the Pollution Control Board had a mandate to take necessary steps against the treatment plant which belongs to the ‘high pollution potential industries’. The company was found guilty of discharging partially treated effluents outside the plant’s premises (Kumar, 2010).

● **Cost of Certification/Verification**

The cost is the most critical obstacle in adopting EMS by SMEs as indicated in numerous studies.(e.g. Zorpas (2010) ; Hillary,2004; Rao et al.,2006). Ravell et al. (2009) argued that “continuous improvement” as a part of EMS is difficult to maintain due to the cost associated to it. Natu (1999) observing the sufferings of the small scale industries in India due to small scale manufacture, meagre profitability, severe competition, limited organisation and importance of process secrecy, suggested that it will be difficult for SMEs to adopt and maintain ISO14001. The



survey done by The Energy and Resources Institute(TERI) reported lack of internal capacity in terms of financial resources as the majority of SME sector suffer with the problems of late payment of bills and lack of access to loan financing. As a consequence, a full scale EMS such as ISO 14001 adoption and implementation will be too costly (Sethi, 2000).

## **EMS ADOPTION BY SMES: AN INTERNATIONAL EXPERIENCE**

Hillary (2001, 561) suggested from her study on European Union (includes 33 studies on European SMEs) that “SMEs do find real benefits from adopting EMS”. She also listed out the barriers that influence adoption of formal EMS by SMEs. The benefits are listed as Internal (organizational, financial and people) and external (commercial, environmental and communication) benefits. The barriers are listed as Internal (resources, understanding and perception, implementation and attitudes and company culture) and external (certifiers/verifiers, Economics, Institutional weaknesses and support and guidance) barriers.

The study by Simpson & Samson (2010) evaluates the relationship between environmental performance as a strategic objective and as an operational objective in reducing waste. Environmental or operational factors are used as variables in this study. It further reveals that the pollution prevention delivers the most tangible gains both in economic benefit to the organisation and protective benefit to the natural environment. Environmental performance was derived from the organisation performance on overall waste reduction and material use efficiency.

The following analysis of literature on international experience of EMS/ISO14001 adoption will shed light on the relationship between uptake of EMS/ISO 14001 and the environmental performance of the companies.

### **■ Improved Environmental Performance**

Melnyk et al. (2003) while assessing the impact of environmental management systems on corporate and environmental performance, state that much research is focused on the need for activities related to waste elimination or reduction, while current research in early 21st Century tries to identify those components that encourage or discourage such activities. This study also assesses the relative effect of formal, uncertified EMSs as compared to the formal, certified EMSs. The Results show that firms that possess a formal EMS see a critical positive impact on many dimensions of their operations’ performance including pollution abatement. Similarly, Potoski and Prakash (2005) from a study over 3000 facilities in US found out that the ISO 14001 certified facilities reduce their pollution emissions more than the non-certifiers. Zorpas’ (2010) review of the international literature identifies four significant benefits associated with SME’s EMS uptake (financial, markets, legislation and community and employee relations), with the largest impact found in reduced energy consumption and waste minimization. Based on European SME data Hillary (2004) identifies the benefits of EMS uptake such as cost savings from material, energy and waste reductions and operational efficiency gains. Other main benefits include firms’ ability to document and demonstrate legal compliance, and to measure environmental performance as well as competitive and marketing advantages, increased recycling and reduced pollution. EMS uptake can also assist in improving the company image and help improve stakeholder relations. Comoglio & Botta (2012) finds Improvement in environmental performance although with heterogeneous values (mostly cost reduction through waste and use of resource reduction). Ilomaki and Melanen(2001) suggested from the results of the study on Finish industrial SMEs that the enterprises with certified EMSs operate well within the legal and statutory requirements and also with regard to energy and wastes, cost savings are eminent, though the EMS results high benefits for entrepreneurs under strong pressure from stakeholders.

According to Seiffert(2008), Ronnenber et al. (2010), Ilomaki & Melanen (2001), Hillary(2004), Potoski & Prakash (2005) and Melnyk et al.(2003), the expected outcome of improved environmental performance will be; reduced input material cost, reduced cost of waste, market advantages, improved credibility, enhanced regulatory compliance.

### **■ The Barriers**

According to Zorpas (2010), the disbenefits for SMEs after adopting EMS are grouped under 3 categories; 1) resources 2) lack of rewards and 3) EMS surprises. He also pointed out that in many studies SMEs do not prefer to take up EMSs as they find the cost of certification/validation too high and/or the formal nature EMSs as inappropriate for smaller firms. This is what, studies by Court (1996) and KPMG (1997) identified as internal barriers. The reduction of wastes in SMEs is driven mostly by the costs of raw materials than by waste costs as suggested by Ilomaki & Melanen (2001) from his study on SMEs in Finland, and Hillary (2004) argued that SMEs (from Europe) prefer cost savings from material, energy and waste reductions and efficiencies. Research by Ilomaki & Melanen (2001) on waste minimisation found that in SMEs from Finland;

➤Waste minimisation is driven largely by cost and that waste costs are too insignificant to provide an incentive to introduce waste reduction.

➤EMS appears to have high instrumental value for entrepreneurs when under pressure from stakeholders.

➤The results may differ depending on firms' internal structure and decision-making processes.

Study from Ravell et al.(2009) suggest that most of the SMEs studied found it difficult to continuously improve their environmental performance as it is expensive. Zorpas(2010) from global studies found out the current research agenda is to investigate key barriers or drivers that change on a national basis due to local circumstances, such as disposal costs, raw material costs, legislation and customers. Chan's (2008) research on the Hong Kong hotel industry found out the six dimensions of barriers that may influence the SMEs negatively in adopting a formal EMS. The barriers are arranged in order of found significance as below.

- implementation and maintenance costs,
- lack of Professional advice,
- lack of knowledge and skills,
- lack of resources,
- certifiers/verifiers, and
- uncertainty of outcome.

SMEs may resist the uptake of ISO14001 certification for a variety reasons (Balzarova et al., 2006; Delmas, 2000 and Bansal & Roth, 2000) which according to Ronnenber et al. (2010) present an agenda for future research. Certification may:

- distract the organization from actual improvement in its EMS
- surprisingly uncover more environmental hazards
- achieve certification for primarily symbolic reasons

From research on Irish SMEs in manufacturing, Burke and Gaughran (2006) found that regional policies such as waste disposal costs, amount of legislations, cost of raw materials and customers impact companies differently from country to country. They suggest research to be done while determining sector specific regional information on the key barriers and drivers that exist. Takahashi & Nakamura (2010) suggest EMS are suitable for simple operations as firm's may not welcome adoption of EMS (as it is voluntary) as a policy initiative, to their facilities with complex operations. So policy makers must keep in mind about this while making voluntary EMS such as ISO 14001 as a policy tool to improve environmental performance as this will require adjustments to EMS practices and sometimes alternative principles need to be adopted other than EMS to achieve environmental objective of the firm.

### **EMS / ISO14001 IN INDIAN SMES**

By 2005 around 1500 organisations in India have become certified to the ISO 14001 standard by 2005 rising to 1800 companies in 2006 (Trends in ISO 14001 Certificates, 2006). A recent ISO Survey (The ISO Survey of certifications, 2010) does not disclose current certification figures for India, but it is reasonable to suggest that the current number of certified firms is in excess of 1800. Most ISO 14001 certified companies in India confirm that "reduction in waste" is the largest benefit they receive from EMS implementation (Khanna, 2008, 1812) while emergency preparedness and response, corrective and preventive actions, and monitoring and measurement are rated lowly by companies. The following studies by Padma et al. (2008); Prakash (2001) and Sawhney (2004) have reported benefits for SMEs in terms of cost savings, organisational benefits and increased market benefits.

Findings from Padma et al. (2008) on a study on ISO 14000 Certification in manufacturing industries found a change in the indicators of organizational performance. Smaller firms have started focusing on Continuous Improvement whereas the medium and larger firms appear quite aware of the continuous improvement and thus experienced smaller changes to get long-term benefits. The findings also suggested that export-oriented firms focus more on identifying and managing environmental issues and processes to improve their end products. The organisational benefits are categorised as internal benefits by Hillary (2004).

It is reported by Prakash (2001) and mentioned in Sawhney (2004) that the formal EMS ISO 14001 certification helped reduce costs, increased competitiveness and international market opportunities. A medium sized garment export firm Prem group in Tirupur, state of Tamilnadu, reported cost savings of about \$100,000(overRs.45 lakhs) per annum from ISO 14001 programs which reduced consumption of water, energy, dyes, etc. So, uptake of EMS can be a competitive tool to enter into global markets.

However, the following studies shed light on some of the grey areas in EMS in India.

According to Khanna (2008), the majority of Indian organisations seem to be implementing EMSs in response to pressure from competitors, customer, government, domestic and export markets and are inclined to become ISO 14001 certified yet fail to take full advantage of all EMS elements. Nyati (1999) found out that the certification is costly and thus out of 71 Indian firms covered in this research, most are large firms and only 25 fall under SMEs and that too all are mid-sized SMEs. Khanna (2010) from his study, based on the feedback received from 62 organizations 75 % of medium category



organizations claim to follow EMS as a guiding philosophy and small category is the weakest in this regard. Though the certification is growing in Indian firms, it is weak when compared to the growth in China, with highest growth in number of certifications acquired (ISO Survey, 2010). Most of the medium sized firms are able to maintain the continuous improvement in environment management due to their high turnover on sales. Amin and Banerjee (2010), from the study on 5 steel mills of India, suggests that peer companies under voluntary compliance may exceed environmental performance than that of a ISO 14001 certified firm. It is suggested that by benchmarking the environmental performance through industry-wide consensus will allow companies to set competitive goal setting. Peer benchmarking also can overcome the limitations of ISO 14001. Padma et al. (2008) found out that Indian firms struggle to identify and prioritise the urgent and important environmental issues whereas the certified firms find it hard to improve continuously in their environment management processes.

ISO 14001 certification is recognized and widely accepted among Indian firms. Amin and Banerjee (2010) stated that though there is a great deal of popularity and regard for ISO 14001 as the standard for excellent environmental performance in India, it does not address many desirable aspects of benchmarking processes such as peer benchmarking, industry-wide benchmarking, requiring minimum standard of environmental performance and public disclosure. This will help SMEs to better gauge their environmental performance.

#### ■ **Formal EMS - ISO 14001:2004**

The only available formal EMS in India is ISO 14001. There are around 1800 organisation (around 0.8% of the world total) who embrace ISO 14001 as per the data released in the ISO Survey of certifications in 2006 (Trends in ISO 14001 certificates, 2006) as compared to the world total of 250,972 as stated in the key findings of ISO survey, 2010.

#### ● **Failure in the past**

In the year 1999, rainwaterharvesting.org reported that:

*“There are several industrial units in Medak district of Andhra Pradesh (AP) that have directly or indirectly polluted groundwater. AP Pollution Control Board (APPCB) officials reveal that Reliance Cellulose is releasing effluents with very high chemical oxygen demand levels into a nearby stream. Standard Organics of Patancheru used to pump untreated effluents into a nearby stream. Birchow, a pharmaceutical company, was dumping sulphomethazole in the open. Today, say APPCB officials, all these companies are meeting environmental norms. “In fact, Birchow has acquired ISO 14001 certification,” they point out.”*

Out of all the polluters as mentioned above Birchow is ISO 14001 certified, but the company’s environmental impact is not any less than that of others. This supports claims by Hertin et al. (2008) and Barla (2007) that plants with ISO 14001 certification show no significant difference in environmental performance when compared to plants without ISO 14001. In this context, Rondinelli and Vastag (2000) claim that ISO 14001 does not measure or ensure improved environmental performance; it only guarantees the same certification standards will always be the same to remain in regulatory compliance. While ISO 14001 standards can provide good ‘common sense’ guidelines that help save cost by reducing waste and pollution prevention when companies follow the spirit of ISO1400 the standard itself does not deliver positive environmental outcomes by default (Rondinelli and Vastag, 2000).

#### ● **A success story of present**

There are many industry examples that show positive environmental performance outcomes as a result of ISO 14001 uptake. One such example is Delhi Metro Rail Corporation Ltd.(DMRC).*“Delhi’s railway network consists of three important railway stations, namely, the Delhi junction; the New Delhi railway station; and the Nizamuddin railway station. In order to improve the connectivity within the capital city, a company named Delhi Metro Rail Corporation Ltd. (DMRC) was given the mandate to construct metro rail tracks in Delhi. Its mission was to:- (i) cover the whole of Delhi with the metro network by the year 2021; (ii) make the network as per the world class standards, in terms of safety, reliability, punctuality, comfort and customer satisfaction; etc. DMRC is the first metro in the world to receive the ISO 14001 certificate at the construction stage, for establishing an environmental management system.”* (Investment opportunities and Incentives, 2012)

This DMRC project not only brought less pollution but also made the journey safe and contributed to Indian Economy. The benefits are listed down.

- It provides reliable and safe journey;
- It reduces atmospheric pollution;
- It leads to decline in accidents;
- It decreases fuel consumption; and
- It reduces traffic congestion on the roads.

The above case mirrors the findings of many studies (shown in Table 5) which claim a positive relationship between EMS uptake and environmental performance.

#### ■ **Informal EMS**

Under The Environment (Protection) Rules, (1986), Rule 14 requires Submission of environment statement amended in 1992 and 1993 by Government of India notification GSR-329E, 1992, G.S.R. 386(E), 1993. The rule reads as below,

*“Every person carrying on an industry, operation or process requiring consent under section 25 of the Water (Prevention and Control Of Pollution) Act, 1974 (6 of 1974) or under section 21 of the Air (Prevention and Control Of Pollution) Act, 1981 (14 of 1981) or both or authorisation under the Hazardous Waters (Management and Handling) Rules, 1989 issued under the Environment (Protection) Act, 1986 (29 of 1986) shall submit all environmental statement for the financial year ending on the 31st March in Form V to the concerned State Pollution Control Board on or before the thirtieth day of September] every year, beginning.”*

The result from the study of Gadenne et al.(2008), though not a sector-specific study by subgroups, confirms that legislation does result in environment awareness in SMEs and so organisations are willing to change their business processes and environmental strategies.

So, existence of improved environmental laws in India pushed most of the Indian SMEs adopt some form of informal environment management systems to meet environmental objective of legal compliance. This can also be expected that the environmental awareness will rise in Indian SMEs which will help them to uptake formal EMS/ ISO 14001. At this moment ‘waste minimisation’ is the main environment aspect to measure environmental performance, which can be reported in Form V under Environment (Protection) Rules, (1986) as a statement only.

## GAP ANALYSIS AND IMPLICATIONS

Table [4] lists the key environmental challenges that Indian SMEs are facing today. Table [5] presents the evidence from the international studies that the three of the environmental challenges (Legal compliance, waste minimization and competitive advantage), can be addressed through uptake of EMS/ISO14001 though Cost of Certification/Verification remains to be the barrier in most of the studies done in India.

**Table 4: Key Environmental Challenges in India**

Environmental Challenges_india	
1	Entry to global Market
2	Legal Compliance
3	Waste Minimisation
4	Cost of certification

Khanna (2008); Prakash (2001); Sawhney (2004); Malavizhi&Yadav(2008-2009); Das & Pradhan(2010) suggests that due to a changing entry-strategy, Indian SMEs to improve their environmental performance

Islam et al., 2001; Kumar,2010,417

Misra and Pandey (2005); Kumar,2010,417; rainwaterharvesting.org(1999)

Is a barrier for SMEs as mentioned by Hillary (2004) ;Rao et al. (2006 ); Ravell et al. (2009); Zorpas (2010) and others from the international study on SMEs worldwide. It remains a barrier for SMEs despite the scheme announced by the Indian government. The reason for this is the cost associated with the maintenance of certification.

**Table5 : International Experience of EMS/ISO14001 Uptake : The Benefits**

Legal Compliance	Pollution abatement/waste minimisation	Competitive Advantage
Ilomaki & Melanen (2001)	Melnyk et al. (2003)	Hillary (2004)
Hillary (2004)	Hillary (2004)	Takahashi & Nakamura(2010)
Potoski & Prakash(2005)	Potoski & Prakash(2005)	Ronnenber et al. (2010)
Burke & Gaughran(2006)	Comoglio & Botta(2012)	Martin-Tapia et al.(2010)
Zorpas (2010)		

**Table 6 : Research Gaps that need to be further investigated in Indian Context**

Suggestion for future research (The Gap)	Author(s) and Year	Industry
SMES under similar external circumstances may adopt different solutions depending on their internal structure and decision making process.	Ilomaki & Melanen (2001)	on SMEs from Finland
Investigation must be on environmental options a firm chooses (formal/informal EMS) and the direct and indirect relationships between these EMSs and performance.	Melnyk et al. (2003)	American Companies
Future research should examine internal organizational structure, levels of education of the workforce and whether or not a firm is a subsidiary of a multinational corporation to mitigate shirking.	Potoski & Prakash(2005)	US Firms
Key barriers and drivers change on a national basis, due to local circumstances, such as waste disposal costs, raw material costs, legislation and customers.	Zorpas (2010)	From International Research
Policy makers choosing ISO 14001 as an alternative policy tool for improving firms’ environmental performance, they need to keep in mind that EMS are suitable for relatively simple operations.	Takahashi & Nakamura (2010)	Japanese firms (Private/Public)
Research is required to consider parts of the sector as subgroup by size (i.e., micro, small, medium)	Hillary (2004)	SMEs from Europe
Limit research to companies which have uniform types of EMS and information can be easily accessed to get valid results	Comoglio & Botta(2012)	Companies in NW Italy
Research is required to determine sector-specific regional information on the key barriers and drivers that exist.	Burke & Gaughran(2006)	Irish (engineering) SMEs in manufacturing
Suggested benchmarking environmental performance through industry-	Amin and	Steel Mills in India

wide consensus will allow companies to set competitive goals. Peer benchmarking also can overcome the limitations of ISO 14001 which does not allow peer-benchmarking and so SMEs are not able to know their environmental performance in relation to others.	Banerjee (2010)	
Future research can be conducted to know whether EMS/ISO14001 distracts the organization from actual improvement in its EMS and surprisingly uncovers more environmental hazards and whether companies achieve certification for primarily symbolic reasons.	Ronnenber et al. (2010)	American Manufacturing Companies

Table [6] lists the gaps that exist in major studies conducted in different geographic areas. The following gaps may be investigated to suggest for the effective implementation of an EMS/ISO 14001 in Indian SMEs. Hillary (2004) suggested a sector-specific research on subgroup by size (example: medium-sized enterprises). This is because SME sector is not a group of homogenous group of companies and thus comparison will be difficult among small, medium and large sectors. There are many literatures available on European SMEs where ISO 14001 uptakes shown a positive link to improved environmental performance. European firms are proactive toward environmental protection, so the results may not be the same when the investigation on the relationship between EMS and environmental performance is done on Indian SMEs. So, Internal structure and decision making process of Indian firms, the environmental options that they have, key barriers and drivers based on local circumstances (such as waste disposal cost, legislations, raw material cost etc.) must also be taken into account while evaluating the relationship (Burke & Gaughran, 2006; Comoglio & Botta, 2012; Melnyk et al., 2003; Ilomaki & Melanen, 2001). The relationship of EMS and environmental performance can be better appraised if the study is done on firms with a similar EMS and with relatively simpler operations as firm's may not welcome adoption of EMS as a policy initiative due to its voluntary nature, and also the firm's operations, if involved in complex operations (Takahashi & Nakamura, 2010). It is necessary to investigate the effectiveness of EMS/ISO 14001 by Peer-Benchmarking (Amin and Banerjee, 2010). Further research should be done on the weak points that have been found out in many studies about ISO 14001 that it may distract the organization from actual improvement in its EMS; it may surprisingly uncover more environmental hazards; and it may achieve certification for primarily symbolic reasons (Ronnenber et al., 2010). This indicates a future investigation on an alternative model prior to implementing a Full-Scale EMS/ISO14001 (Takahashi & Nakamura, 2010).

## CONCLUSION

The aim of the paper was to explore the status and effectiveness of Environmental Management Systems (EMSs) as a means of improving the environmental management performance of Indian SMEs as well as the applicability of the formal uptake of ISO 14001 (uncertified or certified). The study reviewed international experience of EMS/ISO 14001 in SMEs worldwide to do a gap analysis among the key environmental challenges that the Indian SMEs face today and an environmental option of an EMS/ISO 14001 uptake that may help the SMEs meet their environmental objectives while being cost-effective. The study also sheds light on similar Indian studies that are undertaken to evaluate the relationship between an uptake of formal EMS and real environmental performance of the firms. While reviewing the literature, it was found out that there are very limited studies done in this area and most of the Indian SMEs adopt EMS due to the pressure from stakeholders, and those, with ISO 14001 certification, are not able to deliver better environmental results than the SMEs that do not adopt a formal EMS. Future research should investigate whether formal EMS certified SMEs can perform better than that of the SMEs with informal EMS. The 2010 ISO survey figures evidence of 12 % growth in ISO 14001: 2004 uptakes in 155 countries. The major growth has come from China where 14468 new certifications have been adopted by organizations. So, the gap that has been analysed in the previous section of this paper needs to be investigated further to help SMEs in India to meet this global challenge of making themselves environmentally proactive which will make them a part of value-chain and competitive to explore global markets where as domestically they can be more competitive in legal compliance and waste minimization. The success story of Delhi Metro Rail Corporation Ltd. (DMRC) with an ISO 14001 certification can be true for many SMEs. Studies conducted on Indian SMEs suggest that the cost of 'continuous improvement' is too high for SMEs. Looking at this, there is a need of Policy review by Government of India to support SMEs financially towards achieving a formal EMS certification. This paper sets forth a roadmap to further investigate the effectiveness of ISO 14001 in Indian SMEs.

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