

STUDY OF PERFORMANCE OF ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEM IN MANUFACTURING FACILITIES IN INDIA: RESOURCE BASED VIEW AND NATURAL RESOURCE BASED VIEW PERSPECTIVES

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ABSTRACT

India is one of the top ten countries in the world in adoption of ISO 14001 Environmental Management System (EMS). Taking Resource Based View (RBV) and Natural Resource Based View (NRBV) theoretical lens, this study has been conducted on 144 manufacturing facilities in India. The findings of the study suggest that EMS improve the environmental performance as well as public image and market performance, supporting the theory. It also suggest that the improvement in pollution prevention can lead to product stewardship with implementation of ISO 14001 EMS that leads to furtherance of market performance. The improvement in environmental performance has chain like effect on improving public image and market performance.

Key words: Corporate Environmentalism; ISO 14001; RBV; NRBV; EMS Comprehensiveness; Environmental Performance; market performance; Image.

Cite this Article: Heena Sunil Oza, Study of Performance of ISO 14001 Environmental Management System in Manufacturing Facilities in India: Resource Based View and Natural Resource Based View Perspectives, *International Journal of Management*, 9 (3), 2018, pp. 96–110.

<http://www.iaeme.com/ijm/issues.asp?JType=IJM&VType=9&IType=3>

1. INTRODUCTION

Corporate environmentalism (CE) pertains to firm-level efforts to reduce pollution and resource use along with protecting natural habitats. Importantly, firms pledge to undertake these actions beyond the requirements of the law. Corporate environmentalism, views the treating of environmental concerns not as a cost but as an economically attractive strategy.

An Environmental Management System is a solution for integrating the environmental issues in system thinking and bring improvement in environmental performance and thereby market performance and public image of the business organization as an environmentally responsible business (www.iso.org).

ISO 14001 Environmental Management System

In India, in context of corporate environmentalism, ISO 14001 standard is most widely used EMS, India being one of top ten countries in number of ISO 14001 certification which reached 7725 certification in the year 2016 ([www.iso](http://www.iso.org)).

Broadly, the whole concept of ISO 14001 standard is “control and reduce its impact” on the environment by a business firm (Whitelaw 2001). ISO 14001 standards specify the elements of EMS systems with advice on how to initiate, implement, and sustain the EMS. It is a system that aims at the integration of environmental management system with overall management function of an organization ([www.iso](http://www.iso.org)).

The Standard requires an organization to state how it goes about controlling and reducing its impact on the environment in Plan-Do - Check –Action (PDCA) cycle, with a view to bring continuous improvement in environment performance . ([www.iso](http://www.iso.org))

The requirements of ISO 14001 include: Development of an environmental policy; Identification of environmental aspects and evaluation of associated environmental impact ; Establishment of relevant legal and regulatory requirements ; Development and maintenance of environmental objectives and targets ; Implementation of a documented system, including elements of training, operational controls and dealing with emergencies ; Monitoring and measurement of operational activities ; Environmental internal auditing ; Management of review of the system to ensure its continuing effectiveness and suitability ([www.iso](http://www.iso.org)).

2. NEED FOR RESEARCH

The essence of adoption of ISO 14001 is to reduce negative environmental impact and thereby improving environmental performance. The waste reduction in form of reduced consumption of material, energy and water, not only result in pollution prevention but also result in improving economic performance. It also can result in improved image and thereby bring better business results like increased market share, larger exports etc.

However, as critics mention it is conformance based system and does not require disclosure or audit of performance of the system. It is also called “difficult-to-observe” standard and therefore free riding behaviour is likely which can reduce the credibility of the Standard. The effectiveness of ISO 14001 lies in its ability to improvement environmental performance of business firm on continuous basis. As rightly pointed out by Watson and Emery (2004) the standards need to focus on performance”.

Several studies have tried to evaluate how an implementation of an EMS influences the environmental performance, eco-efficiency; business performance; public image; and financial performance. However, majority of the studies are done in developed countries context. To cite a few example, it has been studied for seven OECD countries context (Darnell et. al. (2008) ; Darnall and Kim (2011); Ferrón-Vílchez (2016) ; for USA (NDEMS 2001); Toffel (2005); Potoski and Prakash (2005); ; Yin and Schmeidler (2009) ; Anton et. al (2004) ; Switzerland (Hamschmidt 2001); Japan (MEPI (2001) ; Australia (Phan and Baird (2015); Austria and Newzeland Castka and Prajogo (2013). Canada (Henri and Journeaul 2008). Very few studies are related to developing countries (e.g. for Hongkong (Szeto 2002); Ting 2002); Zimbabwe (Marambanyika & Mutekwa 2009), Maxico (Massoud et. al. 2006 Malaysia (Wanger 2009, Goh yen Nee 2011); Korea (Baek (2014); and still fewer for India (exception being study by Khanna 2008; and in recent past by Prasad and Mishra 2017).

3. INDIAN CASE

The ISO 14001 International Standard has been initiated for fostering green international trade. In the 1986 Uruguay round of the General Agreement on Trade and Tariff (GATT), the negotiations resulted in a commitment to foster international trade. The Agreement on the

Technical Section of the GATT encouraged the use of international standards and conformity assessment systems to improve the efficiency of production and facilitate trade, as well as minimizing the risk that flourishing local and national environmental management standards in the area might constitute a barrier to growth in the global trade (Tibor and Feldman, 1997).

Sawhney (2002) pointed the need for Indian Businesses to aggressively address the green challenge in the world market by increasing environmental certification in the context of steady increase in environmental notification under the provisions of WTO agreement. The empirical findings suggest that the diffusion of ISO 14001 has been from west to east (W. M., & Lee, P. K. C. 2014) due to supply chain pressures; entry into international business (Sandhu et.al 2012). The earlier findings (Delmas 2007; Nicole Darnall 2003) suggest that external institutional pressures play role in adoption of ISO 14001 and as it “difficult to observe” management system standard, free riding behaviours of the business organization cannot be ruled out as findings of empirical studies suggest (Projogo et. al. 2012; Ferrón-Vílchez 2016), which may end up in adoption of ISO 14001 for institutional legitimization and not to bring improvement in environmental performance. In Indian context, Khanna (2008) studied the EMS performance, showing improved environmental performance. However the study has been for small sample size limiting the empirical evidence to be conclusive. Sandhu et al (2012) made case study of 11 Indian manufacturing firms from BSE 500 companies to know the drivers of corporate environmentalism. In the recent years Prasad and Mishra (2017) studied the environmental performance of Iron and steel sector taking CO₂ emissions from Annual Reports of the companies. The findings show that 33 % of the companies that have been ISO 14001 certified showed better performance than their counter parts.

Scholars like Schylander & Zobel (2003) have emphasised the need for both primarily empirical data and meta-evaluations of secondary data on relationship of ISO 14001 adoption and environmental performance.

India is one of the fastest developing countries in the world and therefore corporate environmentalism of its manufacturing industries is the demand of the time. System based environmental protection by manufacturing industry is an enabling factor, but does not guarantee improved environmental, economic or business performance in the firms, and therefore empirical study of performance of ISO 14001 certification is crucial to get the insight about the EMS practices and performance.

This study is an attempt to bridge the research gap by studying the performance of ISO 14001 Environmental Management System in facilities of manufacturing firms in Indian context empirically and thereby contribute the present literature in context of India, a fast developing economy.

4. THEORY AND HYPOTHESIS

Resource Based Theory

According to, Resource Based Theory (Barney 2001; Oliver 1997) physical, human capital and organizational resources that are valuable, rare, imperfectly inimitable and non-sustainable (VRIN) lead to development of internal competencies. These internal competencies combined with external environment can develop competitive advantage.

EMS is developing of capability in form of management system that integrates environmental concerns into its strategic and operational activities with the goal to reduce the negative impact of environment by business firm's activities.

However this requires commitment of resources – financial, physical and human to internalize the EMS.

Yin and Schmeidler (2009) explain that the heterogeneous results of homogenous ISO 14001 EMS can be explained by RBV. As institutional pressures drive the firms in industry / county to adopt it for legitimization purpose, it is internalized in organization heterogeneously due to difference in resource availability. This leads to variation in extent of comprehensiveness. In an empirical study of Spanish metal industries by Castro et.al. (2017) about the quality of implementation, it has been found that a substantial portion as high as 70.1 % of the firms fail to implement high quality EMS practices inside the firm.

Various researchers Anton et.al (2004); Yin and Schmeidler (2009); Phan and Baird (2015); Ferrón-Vílchez (2016); Castro et.al. (2017) have identified that there exists wide variability in comprehensiveness of EMS; mainly attributable to commitment of resources and capabilities of business firm and the quality of EMS has relevance in the output in form of whether it brings improvement in environmental performance or not.

The first objective of the study therefore is to know what is the extent of EMS comprehensive of manufacturing facilities in India? Can it be explained by RBV?

Resource Based View and Natural Resource Based View:

Relationship of Extent of EMS Comprehensiveness and EMS Performance

Hart (1995) expanded the resource based theory to include the challenged posed by constraints of the natural environment in the Natural Resource Based View (NRBV).

Natural Resource Based View is integrating the considerations of environmental issues in strategy development of the organization. As per Hart (1995), the strategy and competitive advantage of a business firm can be constrained by ecosystem and it needs to consider a natural resource based view of the firm for strategy development.

According to Hart (1995) there are three inter-connected environmental strategies a firm can develop: pollution prevention, product stewardship and sustainable development. These strategies are hierchial in nature. The pollution prevention is level one of responsiveness to corporate environmentalism and are 'low hanging fruits' that can be achieved by reduction in emissions, waste, etc. by initiating continuous development initiatives like adoption of ISO 14001 depending on developing labour intensive capabilities. The existence of TQM can help to achieve this strategy. Once this strategy is achieved the firm can go for second level of environmental responsiveness which is product stewardship. The pollution prevention strategy and product stewardship strategy are interconnected. The third and most advanced level of environmental strategy and environmental sustainability. These strategies are of different order can be implemented in inter-connected way or by implementing the higher level strategy embedding the lower strategy as these three strategies are both inter-connected and embedded (Hart 1995).

The second objective of the study is to know does the comprehensive EMS affect the EMS performance in terms of improvement in environmental performance, business performance and image? Can be explained by RBV and NRBV?

A comprehensiveness EMS is developed by implementing various related practices, and integration of environmental concerns into day to day activities adopting PDCA cycle. This involves resource commitment and the decision to integrate EMS in daily operation is more a strategic decision as involves commitment of physical, financial, human, Technological and information resources.

More comprehensive EMS can be developed through better employee training, better communication and establishment of environmental performance targets. Monitoring and other related practices help to identify environmental impacts and targets to be achieved periodically in various environmental aspects like reduction in pollution, air, water, noise, solid waste,

reduction in toxic emission, improvement in natural resource usage and thereby helping in pollution prevention, conservation of natural resources, cost reduction and improvement in process efficiency considered level one type of improvement in environmental performance. These are low –hanging fruits and can be achieved with EMS in short run on continuous basis. As the EMS encourage continuous improvement, once the organization achieve level one environmental responsiveness leading to product stewardship. This may involve redesign of product having less environmental impact which involves collaboration with stakeholders like suppliers, of material etc. The choice of the strategy that the firm can or will actually adopt, will in turn be dependent on the resource endowment of the firm (Sandhu et. al. 2012 p. 205). The stress is in NRBV is on the significance of internal organizational resources and characteristics in influencing corporate environmental responsiveness (Hart 1995, Hart and Dowell 2011 quoted in Sandhu et.al 2012).

The case studies done on EMS adoption and its effect on environmental performance gives insight of how the intricacies of EMS help the business firm to achieve environmental performance through better documentation control; employee training resulting into awareness and involvement and (Morrow and Rondinell (2002); Marambany and Mutekwa (2009) and thereby achieve improvement in regulatory performance (Morrow and Rondinell (2002); Environmental impact reduction/ improvement in environmental performance (Kerekest et.al. (2014) (Darnall & Kim 2011; NDEMS (USA) University of Carolina Project final Report (2003); Alexander et. al. (2008); Marambany and Mutekwa (2009); (Prasad and Mishra (2016); (Anton et.al. (2002); Toffel (2005); increased efficiency (Morrow and Rondinell (2002); cost savings (Morrow and Rondinell (2002); image (Morrow and Rondinell (2002) and Business performance (Hamschmidt (2000); Morrow and Rondinell (2002); Kerekest et.al. (2014).

Yin and Schmeidler (2009) showed that Facilities that integrated ISO 14001 in day to day operations are likely to report that ISO certification contributed to improvement; facilities that include performance management elements in ISO 14001 likely to report a greater environmental performance improvement. A more recent survey based study by Ferron – Vilchez (2016) show that ISO 14001 adopters that monitor an extensive set of negative environmental impacts are associated with real improvements in both environmental and business performance. The findings of Phan and Baird (2015) are also in the similar line, showing improvement in environmental performance measured in terms of four factors namely: resource usage, regulatory compliance, and productivity and stakeholder interactions.

Hypothesis

In the field of ISO 14001 standard, Researchers (Phan and Baird 2015; Delmas (2003); Baek (2014); Castro (2017); Projogo (2012); Yin and Schmeidler (2009); Anton 2004) have shown that there is wide variation in internalization of various elements of ISO 14001. The symbolic adoption of ISO 14001 is adoption of EMS for documentation and third party certification without its integration into daily operations. Such EMS may be marked with gaining public image and market share and not directly related to improving environmental performance of the firm.

There is scant research examining the impact of the comprehensiveness of EMS on environmental performance (Phan and Baird 2015 p. 49). Taking Hart (1995) classification of three strategies of environmental performance this study takes relationship of EM comprehensiveness and the level 1 and level environmental performance.

H1a: The comprehensiveness of EMS affects environmental performance level one.

H1b: The comprehensiveness of EMS affects environmental performance level two.

As discussed in above paragraphs, the environment performance improvement strategy are incremental, one, level one helping level two and so on. The level one environmental strategy

of pollution prevention can be further extended to product stewardship, level two where the strategy of pollution prevention playing the role of mediating variable. Therefore, hypothesis Hab is as under:

H1ab: The comprehensiveness of EMS affects environmental performance level two (EP_2), mediated by environmental performance level one (EP_1).

ISO 14001 standard advocates adoption of the standard based EMS to bring continuous development and thereby also get allied benefits like improved image as green manufacturing / green business firm and thereby gain business advantages in form of increased market share.

Sandhu et. al. (2012) showed the adoption of ISO 14001 in India can be attributed level one corporate environmentalism and its drivers are international connections of businesses, Darnall et. al. (2008) made study of 4 OECD countries, to understand the link of EMS comprehensiveness and its effect of Business performance taking OECD survey conducted in year 2003. The findings suggest that it affects the business performance positively. Similar findings were made by Prajogo et.al. (2012).

H2: The comprehensiveness of EMS affects Market Performance positively in manufacturing facilities in India.

H3: the comprehensiveness of EMS affects public Image of manufacturing facilities in India.

Inter- relationship of Environmental performance and marker performance and public image/

ISO 14001 EMS has the main aim of improving of environmental performance. The improvement in environmental performance brings more exports as it is required by many MNCs for its suppliers to be ISO 14001 certified, so it helps to increase the market share as green manufacturer. It also, in turn develop the public image of environmentally responsible manufacturer. The improvement in environmental performance can result into better market share and better image of the facilities for various stakeholders in chain effect.

The third objective of the study is to know the inter-relationship of environmental performance and market performance and public image.

Prajogo et al (2012) studied the relationship of three bottom lines- environmental benefits, market benefits and social benefits (3BL) from EMS adoption. The finding of the study show that there is positive association between environmental and social benefits and also environmental and market benefits. The findings reveal that the 3BL performance outcomes could reflect a chain of reactions among the benefits of EMS adoption. Starting with environmental benefits, they help the firm to create public image in terms of social responsibility which in turn lead to market benefits. Also the environmental benefits have a direct link to market benefits suggesting that technical value shall precede the market value. The better public image in turn results market benefits.

H4: Improvement in level one environment strategy (EP_1) performance affects Improvement in level two environment strategy (EP_2) performance positively

H5a: Improvement in level one environment strategy (EP_1) performance affects Market Performance positively

H5b: Improvement in level two environment strategy (EP_2) performance affects Market Performance positively.

There is chain effect for level one environmental benefits and level two environmental benefits. Level one environmental benefits (pollution prevention) lead to level two environmental benefits which is related with product stewardship. Therefore, once the organization achieve level two environmental performance it shall help in better market position

and public image and public image in turn improve market performance in terms of increased sale and international operations.

H6a: Improvement in level one environment strategy (EP_1) performance affects public Image

H6b: Improvement in level two environment strategy (EP_2) performance affects public Image

H7: Improvement in public Image affects market performance.

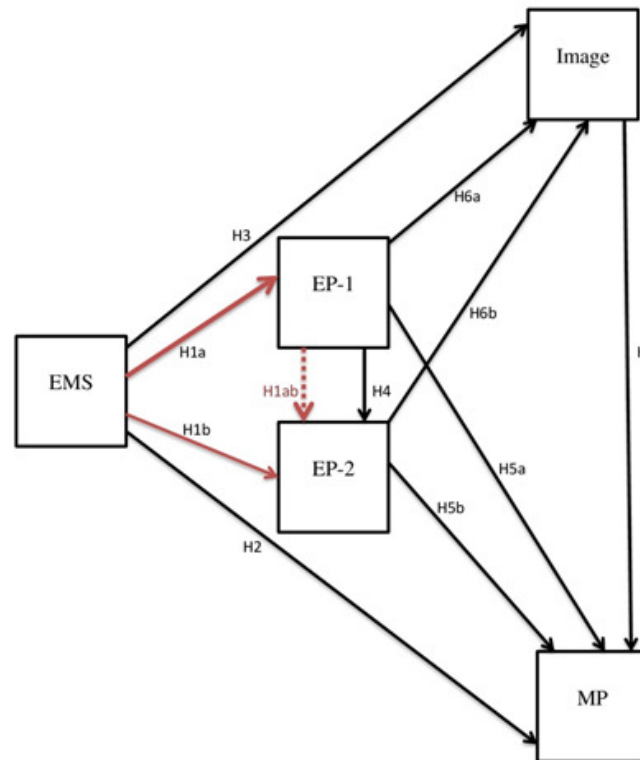


Figure 1: Theoretical Model of the Study

5. RESEARCH METHODOLOGY

As mentioned earlier there are 7725 number of ISO 14001 certificates issued in India (ISO report 2016). However the database / directory of ISO 14001 is not in public domain so convenient sampling method is used. A list of BSE 500 companies was explored to identify manufacturing sector companies having ISO 14001 certification. Additionally other companies were identified from Red category of Industries to add more manufacturing facilities. Also there is mandatory environmental compliance audit for category I manufacturing plants in Gujarat by Gujarat Pollution Control Board. More manufacturing facilities were added to the list by using the database from there. Finally a list of around 780 manufacturing facilities was compiled. All these units were sent the Questionnaire with covering letter, explaining the purpose of the survey by post. If emails were available, it was also sent through e-mail. The Questionnaire was pre –tested in 5 manufacturing firms and based on the inputs changes were made. The data collection period has been from November 2017 to mid-April 2018. Out of 780 Questionnaires sent 154 Questionnaires were returned, duly responded. Out of these 2 units were not ISO 14001 certified and 2 were incomplete, therefore 150 Questionnaires from 144 manufacturing facilities were finally available for data analysis.

A. Measurement

For data collection, survey method has been used, Data are collected from ISO 14001 certified units by way of structured Questionnaire. The unit of data collection is manufacturing unit as the ISO 14001 certification is generally done at facility level.

For collecting the data, Questionnaire has been designed. The questionnaire consists of (I) general questions consisting of name of the respondent, name of the unit, name of the industry to which unit belongs, number of employees, type of product consisting of XI questions. It included 6 questions related to extent of EMS comprehensiveness, in 5 point Likert scale. It ranges from strongly disagree (1), Disagree (2), Neutral (3), Agree (4) and strongly Agree (5). EMS Performance is consisting of 19 statements. Out of 19 statements, 17 statements pertained to environmental performance, 2 statements were for market performance and one statement for public image. The respondents were asked to give answer in 5 point Likert scale about “the extent to which each of the following outcomes is achieved in your organization”. Each statement were given options in 5 point Likert scale with weight given to Not at all achieved (1) ; not achieved (2) ; Neutral (3) ; Achieved (4) and Achieved to a great extent (5) and statements related to drivers for adoption. Annexure 1 gives the various statements and the reference of the same. The Questionnaire also included a write up stating Background and purpose of this study for the knowledge of participating/ respondent manufacturing firms/ units.

B. Scope of the Study

The study is limited to manufacturing sector with unit of sample study being manufacturing unit located in India, having ISO 14001 certification at the time of responding to the questionnaire. ISO 14001: 2004 is now revised and new version of ISO 14001: 2015 has come into force, with certificate holders given the time limit of September 2018 for transition from ISO 14001: 2004 to ISO 14001: 2015. For this study, whether the unit is having 2004 version or 2015 version is not given consideration, as the purpose of the study is to know the experience of respondents on EMS drivers, practices and performance which is based on his/her experience over the years. The empirical data is collected by way of questionnaire on the perception of respondents working in the manufacturing unit. The questionnaire has been administered during the period of December 2017 to mid-April 2018 after a pilot study.

6. RESULTS

The statistical analysis is done with the help of IBM SPSS 20 version. The study includes four variables namely EMS, EP, MP and Image for study where EMS is independent variable and others are dependent variables. Taking Hart (1995) view, EP is further classified into two factors as level one (pollution prevention) and level two (product stewardship) performance. Exploratory factor analysis was conducted on each variable using component analysis with varimax rotation method. Other variables (EMS and MP) were loaded in one factor satisfying the threshold limits of individual factor loading of .5, KMO and Bartley test of sphericity. Table 1 shows the mean value of factors for study after factor analysis.

Table 1 The mean value of factors for study after factor analysis.

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
EMS1_123	150	1.33	5.00	4.5533	.58611
EP1_123	150	1.33	5.00	4.2489	.65673
EP2_123	150	1.17	5.00	3.8556	.84757
MP1_123	150	1.00	5.00	3.8667	1.08012
Image	150	1.00	5.00	4.3200	.81364

(EMS = Environmental Management System; EP_1 = Environmental Performance level 1; EP_2 = Environmental Performance level 2; MP = Market Position).

7. RELIABILITY TEST

An internal consistency analysis has been performed separately for each factor of the study. Results of reliability test measured in Cronbach's alpha. The Cronbach's alpha for Environmental Management System (EMS) is .910 (6 items); Environmental Permanence level one (EP_1) .891 (9 items); Environmental Permanence level two (EP_2).831 (6 items); Market performance .867 (2 items). Image being 1 item, the test was not conducted. As all factors, Cronbach's alpha is more than threshold limit of .6, the scale is reliable and fit for further analysis (Nunnally 1978).

8. CONTENT VALIDITY

According to Saunders et.al. (2009), content validity is the agreement that a question, scale or measure appear logically to reflect accurately what it has intended to measure. Content validity of this study is achieved through inclusion of various questions from earlier studies conducted for the similar purpose (Castka and Prajogo (2013); Phan and Baird (2015); Boiral and Henri (2012); Castro et. al. (2017) and Projogo (2012) and few questions based on literature review as described Annexure 1.

9. FINDINGS OF THE STUDY

Linear regression analysis is used to test various hypothesis. The results of linear regression analysis to test, if the EMS significantly predicted EP_1 performance. The results of the regression indicated the EMS comprehensiveness predictor explained 27.8 % of the variance ($R^2=.278$, $F(1,148) = 56.846$, $p<.01$). It was found that EMS comprehensiveness significantly predicted EP_1 performance ($\beta = 0.527$, $p<.001$). Linear regression analysis to test if the EMS significantly predicted EP_2 performance. The results of the regression indicated the EMS comprehensiveness predictor explained 15.5 % of the variance ($R^2=.155$, $F(1,148)= 27.119$, $p<.01$). It is found that EMS comprehensiveness significantly predicted EP_2 performance ($\beta = .394$, $p<.001$). Further, when without mediator EMS has significant beta on EP_2, however, in the presence of EP1 it becomes insignificant. This means that EP_1 is a mediator between EMS and EP_2 supporting H1ab.

Linear regression analysis to test if the EMS comprehensiveness significantly predicted Market Position (MP) performance. The results of the regression indicated the EMS comprehensiveness predictor explained 5.2 % of the variance ($R^2=.052$, $F(1,148) = 8.097$, $p<.01$). It is found that EMS comprehensiveness significantly predicted MP performance ($\beta = .228$, $p<.001$). Linear regression analysis to test if the EMS comprehensiveness significantly predicted Image of the unit. The results of the regression indicated the EMS comprehensiveness predictor explained 11.8 % of the variance ($R^2=.118$, $F(1,148) = 19.859$, $p<.01$). It was found that EMS comprehensiveness significantly predicted Image of the manufacturing facilities. ($\beta = .344$, $p<.001$). Thus Hypothesis H1a, H1b, H2 and H3 are supported. Linear regression analysis to test if the EP_1 significantly predicted EP_2 of the unit. The results of the regression indicated the EP_1 predictor explained 30.9 % of the variance ($R^2=.309$, $F(1,148) = 66.078$, $p<.01$). It is found that EP_1 significantly predicted EP_2 of the manufacturing facilities. ($\beta = .717$, $p<.001$), supporting Hypothesis 4.

Linear regression analysis to test if the EP_1 significantly predicted MP of the unit. The results of the regression indicated the EP_1 predictor explained 12.4 % of the variance ($R^2=.124$, $F(1,148) = 20.926$, $p<.01$). It is found that EP_1 significantly predicted MP of the manufacturing facilities. ($\beta = .352$, $p<.001$). Linear regression analysis to test if the EP_2 significantly predicted MP of the unit. The results of the regression indicated the EP_2 predictor

explained 35.5 % of the variance ($R^2=.355$, $F(1,148) = 79.932$, $p<.01$). It is found that EP_2 significantly predicted MP of the manufacturing facilities. ($\beta = .592$, $p<.001$), thus Hypothesis H5a and H5b are supported. Linear regression analysis to test if the EP_1 significantly predicted image of the unit. The results of the regression indicated the EP_1 predictor explained 25.7 % of the variance ($R^2=.257$, $F(1,149) = 51.276$, $p<.01$). It is found that EP_1 significantly predicted image of the manufacturing facilities. ($\beta = .507$, $p<.001$). Linear regression analysis to test if the EP_2 significantly predicted image of the unit. The results of the regression indicated the EP_2 predictor explained 19.6 % of the variance ($R^2=.196$, $F(1,149) = 35.967$, $p<.01$). It was found that EP_2 significantly predicted image of the manufacturing facilities. ($\beta = .442$, $p<.001$), supporting H6a and H6b. Linear regression analysis to test if the image significantly predicted MP of the unit. The results of the regression indicated the image predictor explained 19.9 % of the variance ($R^2=.199$, $F(1,149) = 36.746$, $p<.01$). It was $\beta = .446$, $p <.001$), supporting H7.

10. DISCUSSION

The Extent of EMS Comprehensiveness

The first objective of the study has been to know the extent of EM comprehensiveness. The findings show the mean value 4.5533 on Likert scale of 5 (s.d.58), lying between value 4 (practices implanted) and value 5 (implemented to great extent). This clearly show that the EMS is adopted by EMS adopted by manufacturing facilities in India under the study, in comprehensive manner. These practices require commitment of resources and therefore supporting resource based theory of the firm empirically.

Effect of EMS comprehensiveness on Environmental Performance

Pariskar et. al. (2008) identified five levels of environmental orientation in organizations starting from non-compliers, legalistic incrementalism, Green washers, incremental innovators and radical innovators. ISO 14001 EMS is meant for continuous improvement in environmental performance. The certification of this standard based EMS demands a minimum level of EMS to be achieved and therefore, a certified EMS is generally in any organization shall be starting from at least level two to be fulfilling all the regulatory requirements related to environmental issues.

As rightly mentioned by Whitelaw (2001) as one environmental improvement is achieved, it shall aim for the next and so on. The more important issues will surface and therefore EMS provides a system approach rather than an adhoc approach to deal with environmental concerns. The findings of Hypothesis 1a and 1b show that EMS comprehensiveness affect pollution prevention (EP_1) and product stewardship (EP_2), taking RBV and NRBV.

Pollution prevention preparedness results into pollution prevention; waste reduction and resource efficiency leading to eco- efficiency, and saving of natural resource. Level two is more advanced which is improvement in product itself- making it more environmental friendly by way of less toxic emission, recycling, reduced material usage and so on. The finding show that the EMS comprehensiveness improves both pollution prevention and product stewardship in Indian manufacturing firms under study. The explanatory power of pollution prevention (EP_1) is more (27.8 %) compared to product stewardship (EP_2) (15.5 %) as expected. The previous findings by Sandhu et. al (2012) remarked that ISO 14001 EMS is adopted at level one environmental responsiveness. Combining the results of H1a and H1b and taking the findings of H1ab, that pollution prevention strategy (EP_1) is mediating the improvement of product stewardship strategy (EP_2) with EMS, it confirms the Hart (1995) classification of different

level of environmental strategy ; improvements in level one is achieved first, which in turn lead to level two and so on.

Effect of EMS comprehensiveness of Market Performance and Image

The findings of Hypothesis 2 show that EM comprehensiveness affect Market Performance positively. It supports the RBV of ISO 14001. The findings are in line with previous studies by Darnall et. al. (2008). The findings of Hypothesis 3 show that EMS comprehensiveness affect public image positively.

The findings show that comprehensive EMS show highest improvement in terms of EP_1 (27.8 %) followed by EP_2 (15.5 %); public Image (11.8 %) and then MP (5.2 %). This findings suggest that improvement in internal management practices, leads to better capability in terms of EMS and that brings improvement in environmental performance of level one and two both. This also positively brings business advantage in terms of improved market performance marked as more sale and increased international business operations /entry into foreign market/ foreign clients and public image of environmentally responsible manufacturer. Thus, the findings support empirically that comprehensive EMS affect the EMS performance in terms of improvement in environmental performance, business performance and image supporting RBV and NRBV.

Inter- relationship of Three Bottom- line Performances

As the finding of hypothesis 4, and 5a & 5b show that improvement in environmental performance level one leads to level two environmental performance and both level one and two leads to better market performance and image, supporting the RBV that the improving the capability of facilities in terms of internalized EMS brings results in developing capability to improve level one (pollution prevention) and level two (product stewardship) environmental performance which in turn leads to improved social land market performance. The findings show that EP_1 affect EP_2. The findings of relationship of pollution prevention strategy (EP_1 to MP) (12.4 %) and product stewardship strategy (EP __2 to MP) (30.9 %) to market performance (MP) show that the improvement in product as Green product has more explanatory power than improvement in pollution prevention strategy. The empirical findings gives a further insight that for improving the market performance, green product having features of reduced toxic emission, Product re-design with fewer toxic material ; Increased use of residue recycling ; Production of more usable / re-useable products ; Overall increase in cleaner production activities has great relevance.

This also gives highlight that the EMS has great potential to not only improve environmental performance but also market performance by directing the efforts of genuine integration of environmental concern of deeper concern in its performance agenda in line with NRBV – investing resources in developing capabilities of EMS to enable improvement in level one environmental performance, leading to level two environmental performance leading to better market performance in chain effects.

The finding suggest that level one environmental performance affect Image (25.7 %) and level two also affect image (19.6 %) , indicating that pollution prevention (EP_1) has more explanatory power than product stewardship (EP_2). This findings suggest that the improvement in level one environmental performance in pollution prevention aspects, waste reduction, eco-efficiency etc. brings better public image (25.7 %) which lead to improvement in market performance (12.4 %) ; whereas in case of level two environmental performance the results indicate that the impact on market performance is more (30.9 %) than the image (19.6 %). The findings suggest the market would support only the substantial performance

exemplified by the facilities in green product producer, rather than taking the symbolic claim of having ISO 14001 certification merely, supporting the Natural Resource Based View.

Overall the findings of the clearly show that there is improvement in environmental, market and social performance ; highest being in environmental performance (EP_1: 27.8 % ; EP_2 : 15.5 %) ; followed by image (11.8 %) and market performance (5.2 %) in manufacturing facilities in India under the study, as the EMS is internalized in the facilities' day to operations explained by RBV and NRBV.

The third objective of the study has been to know the inter-relationship of environmental performance and market performance and public image. The findings show that improvement in EP_1 and EP_2 coming in sequential manner. The improvement in market performance comes the most through improvement in level two environmental performance that is by adopting the strategy of product stewardship. The strategy of pollution prevention helps to bring improvement in public image which in turn brings improved market performance. The empirical findings supporting Hart's (1995) classifying of strategy and NRBV. It support that EMS comprehensiveness is supported by RBV brings improvement in environmental performance supporting NRBV and the direct effect of environmental performance is having more explanatory power for improvement in image and market performance.

11. CONTRIBUTION OF THE STUDY

Firstly this is very first comprehensive study on performance of ISO 14001 standard, covering EMS practices and its effect on improvement in environmental performance ; market performance and public image in context of Indian manufacturing facilities. This study contributes to the present literature in terms of empirical findings on performance of ISO 14001 EMS in India, one of the developing countries in the world. By and large the study find that the ISO 14001 has made statistically significant improvement in environmental performance in pollution prevention and product stewardship strategies as well public image and market performance (3BL) explained by RBV and NRBV. The substantive EMS is a capability that manufacturing facilities can use for improving 3BL. India being one of the fastest developing countries this findings has relevance to both regulatory authorities, business organisations in manufacturing sector .

The second contribution of the study is it takes into consideration, the mediating effect of level one strategy of pollution prevention (EP_1) on product stewardship (EP_2) The insight from this study that pollution prevention (EP_1) and product stewardship (EP_2) strategies are affected in chain like relationship producing high market performance is done perhaps for the first time in this study. The findings gives insight about how to go about improving market performance by improving pollution prevention (EP_1) and product stewardship (EP_2) strategies of environmental performance improvement taking NRBV is important second contribution of the study.

The third contribution of the study is exploring the direct relationship of 3BL in chain effect, supporting NRBV empirically. The understanding of the relationship that improvement in pollution prevention to product stewardship, to improved market performance and improvement in pollution prevention to public image to improved market performance gives a very important insight to use two environmental performance improvement strategies for manufacturing firms.

12. LIMITATIONS OF THE STUDY

However the findings of the study shall be taken with caution. Firstly this study is though having large sample size of 150 respondents covering 144 facilities, it is a convenient sampling technique used for the study due to non-availability of database of ISO 14001 certificate holder in public domain and therefore cannot be generalized in Indian context.

13. CONCLUSION

Overall, this study suggest that improvement in environmental performance comes from implementation of EMS. The environmental performance further brings improvement in image and market performance so it is beneficial for the manufacturing facilities to adopt more comprehensive EMS as it leads to win-win situation. The ISO 14001 is a very relevant and useful EMS market driven solution for improving environmental performance aligned with wealth maximization objective of manufacturing facilities under study.

Annexure 1 Measurement scale used in the study

1.	EMS Comprehensiveness :
1.1	We clearly documented the environmental policy and procedure for environmental management and continuously update them ^{a,c}
1.2	We maintain our daily operational practices to comply with the documented procedures based on the ISO 14001 requirements ^a
1.3	We conduct regular internal audits and the results are used for improving our procedures ^{a,b,c}
1.4	Environmental performance is periodically captured and measured ^{a,b}
1.5	Environmental information is tracked and monitored regularly and widely distributed ^a
1.6	Process to evaluate environmental risks when selecting suppliers, partners or clients ^b
2	Environmental Performance
2.1	Reduction in material /water / energy consumption per unit of production ^{a,b}
2.2	Reduction in total air emissions of per unit of production ^{a,b}
2.3	Reduction in solid /water waste per unit of production ^{a,b}
2.4	Reduction in toxic emissions of per unit of production
2.5	Reduction in process/ production costs of per unit of production ^{a,b,c}
2.6	Increased regulatory compliances
2.7	Increased filters and controls on emissions and discharge ^{b,c}
2.8	Achievement of zero fines / Reduction in fines paid environmental damage ^b
2.9	Increased process / production efficiency ^{b,c,d}
2.10	Increased knowledge about effective ways of managing operations ^{b,c}
2.11	Increased organization wide learning among employees ^{b,c}
2.12	Increased use of residue recycling ^{c,d}
2.13	Product re-design with fewer toxic material ^e
2.14	Production of more usable / re-useable products ^e
2.15	Overall increase in cleaner production activities ^e
2.16	Special projects related to industrial ecology ^e
2.17	Increase domestic sale /export ^e
2.18	Increased international business operations /entry into foreign market / foreign clients ^e
2.19	Improved image of firm ^{a,f}

a = Castka and Prajogo (2013); b = Phan and Baird (2015); c = Boiral and Henri (2012); d= Castro et. al. (2017); e= self; f= Projogo (2012)

Product re-design with fewer toxic material; increased use of residue recycling; Production of more usable / re-useable products; Overall increase in cleaner production activities

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