Questionnaire for the development of Environmental Regulation Management System for Indian Manufacturing Industries

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ABSTRACT

The primary task of the studies based on survey is the questionnaire development process. The design of a questionnaire involves a systematic procedure. This paper addresses the procedure adopted to design the questionnaire and to evolve policy guidelines for setting up of Environmental Regulation Management System (ERMS) in Indian Manufacturing Industries. During the process development, each and every phase of the questionnaire design is carefully framed based on the guidelines, experiences shared by the domain knowledge people and literature survey. The pre-tests, which are critical for the acceptance of any new questionnaire, are Understandability test and Reliability test. The questionnaire is validated with the above pretests using samples collected from different category of industries.

1. Introduction

Performance assessment of manufacturing industry is a major concern of policy makers and industrialists. Attempts to understand industrial performance encompass two principal questions: *how performance is measured and what drives a superior performance.* Environmental performance is one component of operational performance, which ultimately has repercussions for financial performance (Klassen and McLaughlin, 1996). Environmentally conscious and running sustainable operations address not only the fiscal bottom line, but also the ''triple bottom line'', which includes social and environmental accomplishments, in addition to financial success. Figure 1 illustrates the relationship among the three bottom line pillars of sustainability with the circle diagram. The impact of Environmental Regulation Management Systems (ERMS) has been studied and analyzed in various dimensions, and focused with respect to the living standard of the Society and Environmental - Economic Darwinism (Sloth and Whitta-Jacobsen, 2006). The firms evaluate the impact of the Environment Management (EM) activities across operational, tactical, and strategic EM activities (Montabon et al. 2007). Malarvizhi and Sangeeta (2008) highlighted the relationship between the Social, Economic and Socio-economic with the ERMS. Environmental collaboration not only improves environmental performance, but also on other dimensions such as cost and quality (Vachon and Klassen, 2008). The enterprises must shoulder more environmental management responsibilities to achieve a new form of economy that focuses on sustainable development (Zhongfu et al. 2011). Among various strategies and practices, environmental considerations offer ways to reduce the amount of emissions and waste generated while saving costs at the same time at the operational level. The events of ERMS, through its practices and strategies, indirectly contribute to the advancement of society and to the growth of economy. The proposition that an organization with proactive environmental

management will develop innovative solutions to environmental challenges, which in turn lead to the improvement of other facets of the organization's operations. The above discussions reveal that ERMS, besides making a payment directly to the benefit of environmental protection, plays a major role in sustainable performance and provides competitive advantage in product innovation, process innovation, and sales growth. Sustainable performance, which integrates, economic, ecological/ environmental and social aspects, is the appropriate performance measure of the future (Herrmann et al. 2008, Yarong and Xin, 2011 and Gimenez et al. 2012).
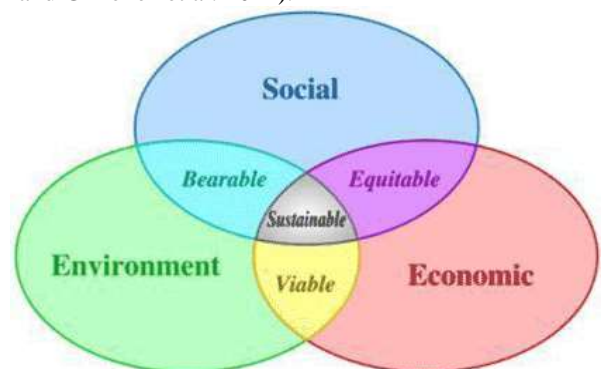
Figure 1. Relationship between the three bottom line pillars of sustainability

(Source: Esty and Winston, 2006)

Sustainability, a factual indicator of the performance of any industry and the synergetic combination of the three measures of Economy, Social and Environmental, is driven by many processes and practices of the industry. In India, until recently, financial performance measures have been the basis for the assessment and evaluation of industrial operations. The selective economic indicators of the Major Asian countries are: per capita Gross National Product (GNP), Gross Domestic Product (GDP), Manufacturing (% of GDP), per Capita Research and

Development (GDR) Expenditure and Exports (Dangayach and Deshmukh, 2000 and 2003). Department of Industrial Policy and Promotion, Ministry of commerce and industry and 'India's Mysterious Manufacturing Miracle (Bollard et al, 2013)' used GDP as the measure for performance of manufacturing industries. The industrial performance is shown in terms of Index of Industrial Production. It is a simple weighted arithmetic mean of production relatives and the weights being proportional to gross value of output as available in Annual Survey of India factory sector. As per the Indian Economic Advisory Council (2012), the Industrial performance is measured by the factors such as GDP, Per capita income altogether in a single term called economical performance. Annexure I shows the economic report of Government of India in which the current GDP, growth rate is shown as 8.2%. The information in respect of performance appraisal in India discloses that the key performance indicators of Indian manufacturing industries in today's scenario are: economic measures such as GDP, Production, Return on Investment and Export. It is essential for any nation to concentrate on economic growth for its development to compete with the competitor nation or for the common survival cause. However, environmental degradation is inevitable for any nation focusing on economic growth as a huge move towards the development of the nation. Moreover, attention towards the nation building through means of economic growth should also be focused on the other non-financial performances. Environmental degradation is a global concern and the developing countries like India should voluntarily participate in developing sustainable national growth through the means of sustainable manufacturing, construction, farming and other services. Gradual transformation of future economy, from the lack of environmental management to a new form of economy focuses on sustainable development. The enterprises must shoulder more environmental management responsibilities. Indian companies have not yet developed a holistic approach to environmental activity, which is the most important part of the three bottom line measures Including economy and social. On the concerns of the significance of sustainable performance, lack of sustainable performance evaluation in India and the influence of ERMS on sustainable performance, the theme of this research is focused on "Development of Environmental Regulation Management Systems for the Sustainability of Indian Manufacturing Industries". This research aims to evolve policy guidelines towards setting the Environmental Regulation Management System (ERMS) for Indian Manufacturing Industries. This requires detailed study of three main aspects: Collection of the relevant data with respect to process, strategies and performance; Identification of the key indicators of sustainability and development of Composite Sustainable Performance Index (CSPI) to assess the performances of the industries incorporating economic, social and socio-economic aspects; Sustainable Performance Analysis of Environmental Practices in Indian manufacturing industries to evolve best ERMS practices to each sector of manufacturing industry.

The data collection is the most critical and crucial step for any type of research study. Inaccurate data collection affects the results of a study and ultimately leads to invalid results. Data collection methods for impact evaluation vary along a continuum. Quantitative methods are at one end of this continuum and Qualitative methods for data collection are at the other end of the continuum

(http://www.worldbank.org/poverty/impact/methods/datacoll.htm). The choice of method is influenced by the data collection strategy, the type of variables, the accuracy required, the collection point and the skill of the enumerator. The main data collection methods are:

Registration: Registers and Licenses are particularly valuable for complete enumeration, but are limited to variables that change slowly.

Questionnaires: Forms which are completed and returned by respondents. An inexpensive method that is useful where literacy rates are high and respondents are co-operative.

Interviews: Forms, which are completed through interviews with the respondent, are more expensive than questionnaires, but they are better for more complex questions, low literacy or less co-operation etc.

Direct observations: Making direct measurements is the most accurate method for many variables, however is often expensive.

Reporting: The main alternative for direct measurements is reporting their activities. Reporting requires literacy and co-operation, but can be backed up by legal requirement and direct measurements.

Questionnaires may be used to collect regular or infrequent routine data, and data for specialized studies. While the information in this section applies to questionnaires for all these uses, examples will concern only routine data, whether regular or infrequent. Some of the data often obtained through questionnaires include demographic characteristics, practices, opinions of stakeholders or management and general information. Based on the strengths and nature of the respondents, this paper considers questionnaire method for collecting the data and addresses the procedure adopted to design the questionnaire for the proposed study. During the process development, each and every phase of the questionnaire design is carefully framed based on the guidelines, experiences of the domain knowledge people and literature survey. The pre-tests, which are critical for the acceptance of any new questionnaire, are Understandability test and Reliability test. The questionnaire is validated with the above pretests using samples collected from different category of industries.

The rest of the paper is organized as follows: Section 2 outlines the questionnaire design process. Section 3 identifies the information required. Section 4 endows with the selection of the Target respondents. Section 5 put forward the method of reaching the target respondents. The content of the questions is explained in section 6. Section 7 deals with the design of the question wording. Section 8 crafts the procedure for order and format of the questionnaire. The length of the questionnaire is defined in Section 9. Section 10 presents the validation of the questionnaire with pre-test. Section 11 provides the fully completed survey form/questionnaire and the conclusion of the paper is provided in the final section.

2. Questionnaire Design Process

Questionnaire Design (QD) refers to the design (text, order, and conditions for skipping) of the questions used to obtain the data needed for the survey. Murray (1999) has demonstrated in his article on "Fundamental issues in QD" that it is a complex and time consuming process and further it is necessary to ensure the validity and reliability of the data collected. In addition, meticulous contribution is more likely to yield data that can be utilized in the pursuit of objective, quantitative and generalized truth, upon which precise and policy decision can be formulated.

Moreover, QD examines the fundamental issues which encompass question wording, question order, and other issues. Unfortunately, QD has no theoretical base to guide the marketing researcher in developing a flawless questionnaire. A researcher has to guide (through) him/her with a lengthy list of do's and don'ts born out of the experience of other researchers of past and present. Hence, QD is more of an art than a science (FAO, corporate document repository) and follows a systematic procedure. This paper adopts the procedure outlined by Food and Agriculture Organization of the UN - corporate document repository (Crawford, 1997) which involves nine steps as shown in Figure 2.
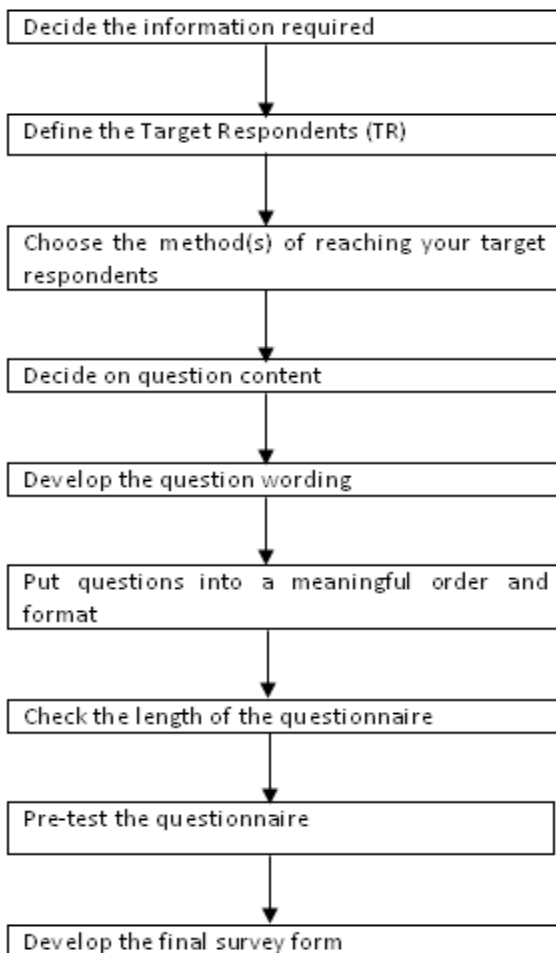

Figure 2 Questionnaire Design process

3. Information Requirements

The study of Indian Manufacturing Industry is centered on two aspects and they are Environmental Management Regulation System and Sustainable Performance. Hence, the data essential for this study should include the details of the Industry (Small/Medium/Large/Labour-Intensive/Automation Intensive), Product and Process (hazardous to Environment, Recyclable, Degradable, Consumer Good, Capital Good etc.), Environmental Practices (ISO, 5S, EMS, ERM, Green technologies) and Indices for Performance Measures (Economical/ Social/ Socio-Economic). This section presents the comprehensive review carried out on the above four aspects.

3.1 Industry related information

Industrial performance studies (Leitham et al. 2000, Ulusoy 2003, Yang 2006) based on questionnaire have included location based attributes (closeness to market, age of the industry, locations of the parent, manufacturing and supplier, and topographical region), business environment (Rural/ Urban/ Semi-Urban/ Global/ Local etc.), and employee details (Education, Experience). This varies with the objective and theme of the study. With respect to this particular study, the following General information about the industry have been identified:

• Location of the industry- To know the sector of earth (topographic location) and its surroundings which is likely to get degradation and ecological disturbances

• Zonal location - To get information about the likelihood quantum and nature of population (people, animals, trees, etc) that would be affected by industrial pollution

• No. of employees - To know the number of people who would get exposed directly to industrial pollution and health hazards, and to classify as small, medium and large

• Work force qualification - To have an idea about the understandability level of workforce towards environment concerns, protection practices and their training needs

• Market place - To derive the breath of environmental effects

• Regulatory body - To know the extent of the environmental protection measures taken by the governing body

• Certification - To determine the environmental Certifications/standards which governs the industry/products from minimal environmental degradation

3.2 Product and Process related information

Environmental degradation means depletion and contamination of natural resources of earth. The products used by the mankind and the process/technology to make them are the causes of them. Hence, it is essential to collect the information regarding the product features and technologies in-order to take appropriate measures towards conservation and preservation of natural resources for the future. Energy efficiency technologies, gas emissions, water pollution, solid wastes, green technologies, occupational hazards and sustainable manufacturing are the primary considerations in environmental studies (Liu et al. 2002, Yang 2006, Jayal et al. 2010). Considering the above facts, the following details with respect to product and process are included in this study:

• The kind of natural resources (Air/Water/Soil) that would get affected/depleted and contaminated by the process

• The existing environmental regulations, concerning the processing technologies of the industry

• The source of water for the process

• The quantum of effluent/emissions by the product / process

• The nature of wastes.

3.3 Environmental and Sustainable Practices

Sustainable Practices can be broadly categorized under Manufacturing Innovation Practices (MIP) and Environmental Regulation Management System (ERMS). MIP, referred as a three letter manufacturing approach (Rho et al. 2001, Singh et al. 2006), includes BPR (Business Process Reengineering), ERP (Enterprise Resource Planning), TQM (Total Quality Management), JIT (Just-In-Time), TPM (Total Productive Maintenance), CIM (Computer Integrated Manufacturing), QFD (Quality Function Deployment), DFM (Design For Manufacturer), Product Data Management (PDM)FMS (Flexible Manufacturing System), CAD (Computer-Aided Manufacturing) and CAE (Computer-Aided Engineering). MIP concentrates more on the economic performance 'WASTE', which is defined as any activity or product that consumes resources or creates costs without generating any form of offsetting stream of value. ERMS is adopted/implemented with strategies such as Environmental Collaboration (Klassen and McLaughlin's 1996),

5S (Singh et al. 2006), Environment Management (Montabon et al, 2007), ISO 14001 certification (Delmas, 2001), Environmental Responsible Manufacturing (Curkovic 2003), Continuous Improvement and Supplier Management (Yang et al. 2010). Jayal et al. (2010) have considered six major sustainability elements such as environmental impact, functionality, manufacturability, recyclability, re-manufacturability, resource utilization/economy and societal impact in their study on 'Sustainable manufacturing: Modeling and optimization challenges at the product, process and system levels'. On the above review and the discussions with the experts from the industries and other agencies, the following facts are identified as best practices that are followed in major industries. Hence, our questionnaire incorporates the following information as suitable for this study.

• Environmental Management System - To recognize the industry's passion in adoption of environmental management practices and learn the industries drive to implement the newer practices in managing environment professionally

• Training on ERMS - To ensure the facilities provided for the employees to acquire knowledge/awareness about the industrial environmental and to know what extent the training is provided in ensuring the success of the environmental practices in the industry

• Environmental audit practices - To find the effectiveness in the implementation of environment practices

• Welfare scheme of the Employee - To recognize the industries' anxiety about the employees' health and know the measures taken to protect the employees from environmental degradation

• Eco-Friendly Practices - To know the influence of eco-friendly practices in socio-economic performance

• Research and Development activities - To identify the industrial practices in motivating innovative themes for becoming leader as well guarding environment

• Expenses for R&D activities - To be acquainted with the investments made at research and development from the total investments

3.4 Sustainable Performance Measure related information

Performance of the industry is commonly used to evaluate its success or the success of a particular activity in which it is engaged. There are, in general, four types of measures for the performance appraisal of any business organization and are: Market valuation, financial measures, Non-financial measures and Cost measures (Meyer, 2002)**.** The strategic management scholars assess the performance of firms mainly from the financial aspects. The most often used financial measures are: Gross Domestic Product 'GDP', per Capita Income, Productivity, Exports and Imports, per capita Gross National Product 'GNP', Manufacturing '% of GDP' and Gross per Capita Research and Development 'GDR' expenditure (Russell and Zhai, 1996 and Dangayach and Deshmukh, 2000 and 2003, Sirikrai and Tang, 2006 and Rashidi and Samimi, 2012). However, 'Harvard Business Review Report' states that a business should measure not only its financial output but also other areas of performance (Ammar et al. 2003). Management accounting researchers have criticized relying solely on financial performance measure and evaluation of an industry only in terms of its financial performance is no longer acceptable (Zuriekat et al. 2011). Enterprise durability and qualitative growth are the two most focusing non-financial performance indicators. Global vision, Improvement and Diagnostic are the

three keywords considered as the performance of enterprise durability and that is to be adopted for the continuous improvement (Berraha et al. 2000). Quality growth (Yarong and Xin, 2011) refers to the concept 'all around, harmonious and sustainable development' and the '5E audit' (Environment, Equity (i.e. social order), Economy, Efficiency and Effectiveness). The information on environmental, social and corporate governance has experienced attention around the world permeating into the focus of not only the general public but corporations, accountants, analysts, investors as well as policy makers. Many investors have started to take increased consideration to the social and environmental aspects of the firms they invest in as well as the economic aspects (Cerin and Reynisson, 2010). The non-financial measures to assess the performance of industries are centered around Environmental, Social and Corporate Governance (Orlitzky et al. 2003, Esty and Winston 2006 and Gimenez et al. 2012). On the above concerns, the following measures, that reflect any one of the three types of performances (i.e. Economical, Social and Socio-Economic), are selected for this study:

Economic Measures

• Production - To know the quantity produced, its subsequent GDP contribution and the breadth of the product distribution

• Income / profit - To identify the economic performance of the industry with respect to its revenue generation

• Turnover - To find out the turnover of the industry, in order to find the efficiency of the practices followed by the industry through its performance protection of the environment

• Return on Investment - To know the environmental degradation due to industrial pollution and its corresponding depreciation to the assets of the industry and the locality as well

Social Measures

• Literacy Rate - To identify the understandability of the internal and external customer about the conservation practices of the environment from industrial pollutions

• Accidental Rate - To know the implementation/ adherence of the safety measures

• Crime Rate - To know the poverty line and therefore the standard of living of the population

• Patient admissions in hospitals - To know the general health of the people in the locality

Socio – Economic Measures

• Per capita income - To know the standard of living

• Transport and communication facilities - To know the development of enhanced facility for better connectivity

• Regularity of the employee - To identify the health of the employee who is always exposure to the industrial pollution and the regularity will indicate the good/poor habits of the employee

• Unity and Morale of the employees - To find the internal and external customers morale and unity from the social responsibility, wealth and health in conserving environment of the industrial locality

4 Target Respondents

Accurate as well as reliable data in the questionnaire purely/solely depend on the respondents of the questionnaire. This necessitates identifying the suitable respondent group for any survey. The personal characteristics of the respondents such as age, income, education, residence, degree of knowledge and concern in politics are considered in the questionnaire of the poll-survey (Park et al. 2006). Dowlatshahi (2008) has recognized maintenance manager as the target respondent in his paper, since industrial maintenance has mostly viewed by the

manager as technical issue within the domain of manufacturing and engineering functions. Computer knowledge and age are considered as the basis for screening the respondents in the survey on non-response and non-coverage in an internet survey (Couper et al. 2007). Client organizations and main contractors, who have direct hands-on involvement in Pay For Safety Scheme (PFSS) projects, have been chosen as respondents to the survey conducted for the implementation of PFSS (Chan et al. 2010). Frontczak et al. (2012) has stressed that it is important to identify the respondent's characteristics that influence the field of study especially the information on the subject is not extensive. Background questions are raised in the form of socio-demographic questions regarding age and gender of the respondent and co-habitants, education and type of work of the respondent. Naghavi et al. (2012) in their design and validation paper to measure the attitudes of hospital staff, the information included are occupational group (designation wise classification), age group of the respondent, gender, kind of job and employment (regular, part time, contract etc.). The above studies indicate that the following characteristics are essential for the respondent groups: Direct involvement and exposure in the field of study and sufficient domain knowledge and Respect on societal interests to support the community. On the above considerations, the respondent groups for this study are fixed as follows:

• Executives of the manufacturing industries (General manager, Works /finance manager, Supervisor)

• Experts from the pollution board, environmental / industrial consultants (Environmental manager/auditor)

• Environmental policy makers (Executives from pollution board , Research and Development and NGO's)

5 Method of reaching target respondents

There are various means of reaching the respondents for the questionnaire survey. Crawford (1997) has stated that the predominant type of reaching respondents is through **interviews**, and it can be classified into structured and unstructured. In addition, the target respondents are reached through **postal letters**. Korpinen et al. (2009) have posted the questionnaire with a cover letter to the participant. In the letter, the leader of study explains the nature of the study and gives some practical instructions and a separate page with an example how to answer questions. Kitis et al. (2009) in their paper collected the data through two types: **face to face interview** and the workers were **given questionnaires** and asked to complete the questionnaires in the resting room. Chan et al. (2010) practiced postal and electronic mail for the collection of information through several sets of self-administered questionnaire. Naghavi et al. (2012), followed an online questionnaire method, which was designed and **electronically distributed** to the respondents and the feedbacks were received. Boschman et al. (2012) stated the advantages of the internet as User-friendly, Speed and No need to return the questionnaire by mail. The benefits of the internet based survey are use of modern technology and a paper-saving method. There exist various types of reaching the customer. This project aims to cover a larger portion of the small and medium Indian industries and is to be handled carefully in selecting the prompt mode of reaching the respondent. The adopted method should be of lesser cost, user friendly, authenticated, unbiased nature and faster communication. It is concluded that the possible mode of reaching the above said scale of industries is finalized from the above literature surveys as electronic mail method for medium industries and postal mail method for small

industries which lack internet facility. Hence, from the above surveys it is concluded that the electronic mail and postal mail methods of reaching the target respondent is adopted for the current study.

6 Decide of question content

When the questions are asked in an open manner, (i.e. providing opportunity for the respondent to answer on-his own lists and words), the answers will have many portions without clarity. This requires the analyzer to categorize, and omit certain unacceptable answers, which are normally confusing, difficult and time consuming. In order to avoid confusion and fit into specific options/ categorization, the contents of the questionnaire are pre-defined so that the respondent can understand well about the nature of information required and can provide correct data. Besides the accuracy, the precision of data depend on the option list (i.e. contents), which is required to support the questionnaire. Table I presents the different options to each of the chosen data needed for this study. They are evolved through various company reports, regulatory board disclosures as given in Annexure II and discussions carried out at seminars and expert consultations. Industrial and environmental experts' advices help predominantly in generating more relevant optional list.

7 Develop the question wording

The wording of survey questions is very important for a successful delivery of prompt meaning in a customer survey. Yang (2005) has provided the guidelines as *should and should not* be for good survey questions as:

Good survey questions should be

• Clear, easily understandable, and stated in a direct and straightforward way

• Specific and precisely stated so that the respondent knows exactly what is being asked

• Unambiguous and unequivocal so that there is only one way to understand or interpret what the question is asking about

• Simple and brief rather than complicated, cluttered, and long-winded

• Stated in terms that the respondents are likely to be familiar and comfortable with, without using complex technical terminology, or sophisticated wording

Good survey questions should *not* be

• Leading. They should not draw the respondent toward a specific answer or make some answers clearly unattractive or undesirable

• Multipurpose. They should not ask about two or more things together in the same question

• Threatening. They should not make the respondent uncomfortable or put the respondent in a difficult or compromising position.

Hence, it is important that the questionnaire should consist of right wordings in every question of each section and it should put forth the precise meaning which brings the respondent under the state ease of understand. The length of the question should be minimal, may it be a single word. Considering the above guidelines and the understanding capacity of the respondents identified for this study, question wording is coined for each question so that it reaches the respondent in an unambiguous manner. Table II presents a few sample question wordings.

8 Order and format for the meaningful question.

The general procedure for drafting the question sequence in the questionnaire may adopt the following guidelines (http://en.wikipedia.org/wiki/Questionnaire_construction#Question_sequence):

• Questions should flow logically from one to the next

• The researcher must ensure that the answer to a question is not influenced by previous questions

• Questions should flow from the more general to the more specific

• Questions should flow from the least sensitive to the most sensitive

• Questions should flow from factual and behavioral questions to attitudinal and opinion questions

• Questions should flow from unaided to aided questions

Lambin (2007) points that the following points should also be considered in order to determine the sequence of questions to get maximum effect:

• Use simple and interesting opening questions: If the opening questions are interesting, simple to comprehend and easy to answer, the respondent's co-operation will be gained

• Use the funnel approach: The funnel approach involves beginning with a very general question on a topic and gradually leading up to a narrowly focused question on the same topic

• Arrange questions in logical order: Sudden changes in subject confuse the respondent and cause indecision

• Place difficult or sensitive questions near the end. Sensitive questions should be relegated towards the end of the questionnaire, once the respondent has become involved in the study

Following the above guidelines, table III shows the order and format of the questionnaire is formatted and arranged under different headings/sections as industry details, product/ process details, environment / sustainable practices, economic performance, social and socio-economic performance measures.

9 Length of the questionnaire.

According to Light Speed Research Global Online Research Panels Company, support provider for surveys, 'the length of a questionnaire can have a negative impact on completion rate and response quality, Frede (2010). Bazzazian and Besharat (2010) admitted that their Illness Perception Questionnaire with over 80 items was difficult to use. Maximum length of the questionnaire will make any respondent tiresome and the answers may not be a reliable. Hence, length of the questions and the questionnaire should be of minimal level covering all the relevant content to be questioned to the respondent. Moreover, questionnaire should not be time consuming. The questionnaire developed for the project would consume only 10 to 15 minutes that is considered to be an affordable time for a respondent to respond conveniently without tiresome. Initially, the questionnaire was designed in a sentence type format, which consumed a considerable time to read and difficult to understand the questions by the target respondents. That is avoided by trimming the question content as well the optional list to make less time consuming along with clarity.

10 Pre test the questionnaire

For most surveys, the use of an existing questionnaire is preferred, whether the purpose is proactive monitoring, response to complaints, or a screening survey carried out in a research project. By using a standard questionnaire, the results of the survey can be compared with a wider database. In some cases, there will be a need to modify an existing questionnaire. In such cases, or where questions are borrowed from existing questionnaires to create a new one, pretesting is important because the meaning of questions can be affected by even small wording changes and by the context provided by neighboring questions in the questionnaire (Rathouse and Raw, 2000). This

is very critical and essential with respect to new questionnaire. Coluci et al. (2009), in their paper, carried out pretest to an existing questionnaire with their contents modified with a sample of 40 respondents. The composition of the sample is: 20 production workers, 15 office workers, and 5 independent professionals with different occupations. Ehring et al. (2011) validated preliminarily the factor structure, reliability and validity of the new questionnaire designed to measure repetitive negative thinking and adopted pre-test as the first step to correct the contents using three sample data, viz. internet sample, non-clinical sample and clinical sample. The above studies confirm that the pre-test must be carried out with different samples and different groups. Besides, whenever the questionnaire is modified or altered or freshly developed for new study, the scores of the respondents vary due to many factors as listed below (http://www.quickmba.com/marketing/research/qdesign):

• True differences in the characteristics being measured

• Differences in other characteristics such as response styles

• Differences in transient personal factors such as fatigues, etc

• Differences in the administration, such as interviewer tone of voice

• Differences resulting from sampling of items show the characteristics being measured

• Differences caused by mechanical factors such as space to answer, inadvertent check marks, etc

The questionnaire is considered valid and reliable, when the differences in scores (answers) of the same respondent at certain intervals or different respondents of the same company are minimum. Taking the above factors into consideration, the questionnaire developed for this project is pre-tested with the responses of the three respondents chosen from ten different industries (Large - 2; Medium - 5; Small - 3) those are distributed three times at the interval of two weeks, Via General manager (R1), Works Manager (R2) and Supervisor (R3). Questionnaires are also sent through e-mail (medium and large industries) or postal mail (small industries). Though the number of questionnaires that are distributed accounts to 90, the responses are only 59 (19 responses in the first stage/level, 18 responses in the second level and 22 responses from the third and final level of sample data collection stage). In the first stage, a total number of 15 electronic mailing and 04 postal mailing are received, 13 e mails and 05 postal mails in the second interval and at final, 16 electronic mailing feedbacks and 06 postal mailing feedbacks are received. Table IV shows the number of responses received from the respondents of different categories.

The pre-test is carried out in two phases using SPSS software following the consistency testing procedure outlined by Abdi et al. (2012). In phase one, the respondents' understandability of the questions and their contents are analyzed by correlating each individual's responses made at different times. The data of the ten respondents, who responded to all three circulations, are considered for this understandability test. The results of the correlation study are given in Table V. The analysis reveals that all the three category of the respondents are able to understand the most of the questions. It is evident from the number of times the same answer (or closer) is given by all the ten respondents at different times to the same question. In phase two, the questionnaire is tested for its reliability through correlation analysis. This study is conducted industry-wise, with the answers to 36 questions by three respondents, selected one each randomly from each category of the respondent.

Table I Particulars of relevant data and its optional lists

S.No.	Relevant data	Optional list
1.	Location of the company	Tropical, Hill station, Coastal, Plains, River Basin
2.	Zonal location	Rural Area, State Industries Promotion Corporation, Export Processing Zone, Special Economic Zone , Technology Park
3.	No. of the employees	Ranges as 1-50, 51-100, 101-200, 201-500 and More than 500
4.	Work force qualification	Temporary, Contract, Permanent and their combination
5.	Market area	State, Regional, National, Inter National
6.	Regulatory body	Industrial Association, local, State, Central, International
7.	Major Pollutant	Air, Soil, Water, Human/Living, Ozone layer
8.	Effluent / Emission from process	Ranges between more than 50%, 50-21%, 20-6%, 5-1% and less than 1%
9.	Nature of the waste	Non recyclable, Recyclable, Partial recyclable, Negligible Waste, Zero waste
10.	Accumulation of toxic gases/liquids (Process/use)	Proportion ranges as more than 30% from the source, 10-30%, 5-10%, 2-5% and less than 1%
11.	Certification	BIS, ISI, EU/UN, ISO. Non-Standard
12.	Quality/ Management Practices	Six sigma/ Zero Defect, Product chart, Lean manufacturing, 5S, Eco Friendly
13.	Environmental Management System	ISO 14000, Green Manufacturing, Cleaner Production, Lean manufacturing, ISO 9001
14.	welfare scheme of the Employee	Proportion ranges as less than 0%, 1-5%,6-20%,21-50% and more than 50%
15.	Training on ERMS	Intervals ranges as Yearly, Half yearly, Quarterly, Bimonthly, Monthly
16.	Environmental audit Practices	Intervals ranges as Yearly, Half yearly, Quarterly, Bimonthly, Monthly
17.	Research and Development activities	Proportion ranges as less than 1%, 1-5%,6-15%,16-30% and more than 30%
18.	Expenses for R&D activities	Proportion ranges as less than 0%, 1-5%,6-20%,21-50% and more than 50%
19.	Production	Distributed in Likert scale as Extremely poor, Below average, Average, Above average and Excellent
20.	Turnover	Distributed in Likert scale as Extremely poor, Below average, Average, Above average and Excellent
21.	Return on Investment	Distributed in Likert scale as Extremely poor, Below average, Average, Above average and Excellent
22.	Literacy Rate	Distributed in Likert scale as Very Low, Low medium, Medium, High and Very High
23.	Accidental Rate	Distributed in Likert scale as Very Low, Low medium, Medium, High and Very High
24.	Crime Rate	Distributed in Likert scale as Very Low, Low medium, Medium, High and Very High
25.	Patient admissions in hospitals	Distributed in Likert scale as Very Low, Low medium, Medium, High and Very High
26.	Per capita income	Distributed in Likert scale as very probably, Probably Not, Probably, Very probably and Definitely
27.	Transport and communication facilities	Distributed in Likert scale as very probably, Probably Not, Probably, Very probably and Definitely
28.	Regularity of the employee	Distributed in Likert scale as very probably, Probably Not, Probably, Very probably and Definitely
29.	Unity and Morale of the employees	Distributed in Likert scale as very probably, Probably Not, Probably, Very probably and Definitely
30.	Professional Experience of the employees	Experience in number of years ranging from 5 to 30 years
31.	Societal contact of the employee	Societal involvement/responsibility of the respondent

Table II Difference in the Question content and wording

Q. No.	Information Content	Question wording	Reason(s)
8.	Effluent / Emission from product	Quantum of Emission by the product expressed as % of fuel consumption	Converting this into two will differentiate the polluting source whether it is from product of process
		Quantum of effluent (Toxic Substances) resulted by the process expressed as % of processing material	
16.	Environmental audit practices	Frequency of Environmental audit practices	This will provide how closely environmental concerns are monitored
23.	Accidental Rate	Drop in Accidental Rate	The question wording clarifies the "Drop" of the accidental rate

Table III (A) General: Industry Details

S.No	Particulars	Your Feed Back (by providing √ Mark)				
A1.	Location	Tropical	Hill station	Coastal	Plains	River Basin
A2.	Zonal location	Rural Area	State Industries Promotion Corporation	Export Processing Zone	Special Economic Zone	Technology Park
A3.	No of employees	1-50	51-100	101-200	201-500	≥ 501
A4.	Work force	Contract (C)	Temporary (T)	C + P	T + P	Permanent (P)
A5.	Market area	State(S)	Regional(R)	National(N)	Inter National(I)	Both (N + I)
A6.	Regulatory body	Industrial Association	local	State	Central	International
A7.	Certification	BIS	ISI	EU / UN	ISO	Non-standard

Table III (B) Product/Process Details

S.No	Particulars	Your Feed Back (by providing √ Mark)				
B1.	Nature of Waste	Non recyclable	Recyclable	Partial recyclable	Negligible Waste	Zero waste
B2.	Quantum of Emission by the product expressed as % of fuel consumption	≥ 50%	50-21%	20-6%	5-1%	≤ 1 %
B3.	Quantum of effluent (Toxic Substances) resulted by the process expressed as % of processing material	≥ 50%	50-21%	20-6%	5-1%	≤ 1 %
B4.	Environment regulations governing the process/ product	Air pollution act	Soil pollution act	Water pollution act	Industrial waste act	Environmental protection act
B5.	Pollution Impact	Air	Soil	Water	Man Kind	Ozone layer
B6.	Water Source	River/lake	Ground water	Rain water	Municipal water	Other

Table III (C) Environmental / Sustainable Practices

S.No	Particulars	Your Feed Back (by providing √ Mark)				
C1	Training on ERMS to employees	Yearly	Half yearly	Quarterly	Bimonthly	Monthly
C2	Frequency of environmental practices Audit	Yearly	Half yearly	Quarterly	Bimonthly	Monthly
C3	Environmental Management System	NIL	Green Manufacturing	Cleaner Production	In Campus ETP/STP plants	ISO 14000
C4	Proportion of employees involved in R&D activities	≤ 1 %	1%-5%	6%-15%	16%-30%	≥ 30%
C5	Proportion of Expenses from turn over for R&D activities	≤ 0 %	1%-5%	6%-20%	21%-50%	≥ 50%
C6	Quality/ Management Practices	Six sigma	Product chart	EOQ	Zero defect	Eco Friendly

Table III (D) Economic Performance

S.No	Particulars	Your Feed Back (by providing √ Mark)				
D1	Income / profit	Poor	Below average	Average	Above average	Excellent
D2	Production	Poor	Below average	Average	Above average	Excellent
D3	Turn over	Poor	Below average	Average	Above average	Excellent
D4	Return on Investment	Poor	Below average	Average	Above average	Excellent

Average during last five years: Poor = -30 %≤ , Below average = -29% to -6%, Average = -5 %to 5%, Above average = 6%-29%, Excellent = ≥ 30%

Table III (E) Societal Performance

S.No	Particulars	Your Feed Back (by providing √ Mark)				
E1.	Increase in Literacy Rate	Very Low	Low	Medium	High	Very High
E2.	Drop in Accidental Rate	Very Low	Low	Medium	High	Very High
E3.	Fall in Crime Rate	Very Low	Low	Medium	High	Very High
E4.	Decline in Patient admissions in hospitals	Very Low	Low	Medium	High	Very High

Proportional Change during last five years: Very low = -30 %≤ , Low = -29% to -6%, Medium = -5 %to 5%, High = 6%-29%, Very High = ≥ 30%

Table III (F) Socio-Economic Performance

S.No	Particulars	Your Feed Back (by providing √ Mark)				
F1.	Per capita income increased every year	Very probably not	Probably not	Probably	Very probably	Definitely
F2.	Transport and communication facilities has improved	Very probably not	Probably not	Probably	Very probably	Definitely
F3.	Regularity of the employee is good	Very probably not	Probably not	Probably	Very probably	Definitely
F4.	Unity and Morale of the employees are high	Very probably not	Probably not	Probably	Very probably	Definitely

Proportion change during last five years: Very probably not = -30 %≤ , -29% to -6% = Probably not, -5 %to 5% = Probably, 6%-29% = Very probably,≥ 30% =Definitely

Table IV Responses by the respondents from different categories

Type of Industry	Respondents returned the Questionnaire			Total number of responses	Promptness of respondents (No. of times replied to three circulations)		
	First circulation	Second circulation	Third circulation		Three	Two	One
Large 1 (L1)	R2, R3	R1, R3	R1,R3	6	R3	R1	R2
Large 2 (L2)	R1,R2	R1,R2	R1,R2,R3	7	R1, R2	-	R3
Medium 1(M1)	R3	R1,R3	R1,R3	5	R3	R1	-
Medium 2(M2)	R2,R3	R1,R2	R1,R2,R3	7	R2	R1,R3	-
Medium 3(M3)	R1,R3	R1,R3	R3	5	R3	R1	-
Medium 4(M4)	R2,R3	-	R1,R2,R3	5	-	R2,R3	R1
Medium 5(M5)	R1,R2	R1,R2	R2	5	R2	R1	-
Small 1(S1)	R1,R2,R3	R2	R2,R3	6	R2	R3	R1
Small 2(S2)	R1,R3	R2,R3	R1,R2,R3	7	R3	R1,R2	-
Small 3(S3)	R1	R1,R2,R3	R1,R2	6	R1	R2	R3
Total responses	19	18	22	59	(10 x 3) = 30	(12x2) = 24	(5x1) = 5

*(R1 – General Manager, R2 – Works Manager, R3 – Supervisor)

Table V Understandability study with the respondents

Q. No.	Same answer in all three occasions										Same answer in two occasions										Indifferently									
	L1-R3	L2-R1	L2-R2	M1-R3	M2-R2	M3-R3	M5-R2	S1-R2	S2-R3	S3-R1	L1-R3	L2-R1	L2-R2	M1-R3	M2-R2	M3-R3	M5-R2	S1-R2	S2-R3	S3-R1	L1-R3	L2-R1	L2-R2	M1-R3	M2-R2	M3-R3	M5-R2	S1-R2	S2-R3	S3-R1
A1 - A10	9	8	9	10	9	8	7	10	8	9	1	2	1	0	0	1	2	0	2	0	0	0	0	0	1	1	1	0	0	1
B1-B6	3	4	5	4	5	4	5	5	4	4	2	2	1	1	1	2	1	1	1	1	1	0	0	1	0	0	0	0	1	1
C1- C4	3	3	3	4	3	4	3	3	3	3	1	1	1	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
D1-D4	3	3	3	3	4	4	4	4	4	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
E1-E4	4	2	3	3	3	3	3	3	3	3	0	2	0	0	1	1	1	1	1	1	0	0	1	1	0	0	0	0	0	0
F1-F4	4	4	3	2	3	3	3	4	4	4	0	0	0	2	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0
G1-G4	3	3	3	3	4	4	2	4	2	4	0	1	1	1	0	0	2	0	2	0	1	0	0	0	0	0	0	0	0	0
Total	29	27	29	29	31	30	27	33	28	29	5	9	5	5	4	5	8	3	7	3	2	0	2	2	1	1	1	0	1	3

Table VI Correlation analysis for the reliability of the answers by the respondents Industry-wise

Industry	Responses to samples				Correlation between the responses (on all 36 questions)		
	Q. No	R 1	R 2	R 3	R1 X R2	R1 X R3	R2 X R3
Large 1	A1	1	1	1			
	B3	5	5	5			
	C3	1	1	1			
	E1	4	5	5			
	F4	5	5	5			
	G3	5	5	5	0.980581	0.980581	1
Large 2	A2	1	1	1			
	B2	5	5	5			
	C4	1	1	1			
	E5	5	4	5			
	F4	5	5	5			
	G1	5	5	5	0.980581	1	0.980581
Medium 1	A5	2	2	2			
	B5	5	5	5			
	C2	1	1	1			
	E4	5	5	5			
	F3	5	5	5			
	G2	5	5	5	1	1	1
Medium 2	B1	3	3	5			
	C1	2	2	2			
	D4	1	1	1			
	E4	4	4	4			
	F4	5	4	4			
	G1	5	5	4	0.970725	0.759257	0.782154
Medium 3	A10	1	2	1			
	B2	4	4	4			
	C2	1	1	1			
	D3	2	4	2			
	E1	4	4	4			
	F3	4	4	4	0.832871	1	0.832871
Medium 4	A9	1	1	1			
	B3	5	5	5			
	C3	1	3	3			
	D2	3	3	3			
	E2	3	3	4			
	G2	5	4	4	0.841158	0.818317	0.95449
Medium 5	A5	3	3	3			
	B4	4	4	4			
	C4	1	1	1			
	D1	2	2	2			
	E3	4	4	4			
	G4	5	5	5	1	1	1
Small 1	B5	3	3	2			
	C4	1	1	1			
	D1	2	2	2			
	E1	5	4	4			
	F4	4	4	4			
	G3	5	5	5	0.970725	0.948683	0.964764
Small 2	A1	1	1	1			
	B6	3	1	1			
	C3	1	1	1			
	D2	2	2	2			
	E2	3	4	3			
	G1	4	4	4	0.747958	0.783349	0.966755
Small 3	A3	1	1	1			
	B3	1	1	1			
	C2	1	1	1			
	D3	5	5	4			
	E4	4	4	4			
	F3	5	5	5	1	0.982305	0.982305

Table VI shows the sample analysis. The industry-wise correlation analysis reveals that the questionnaire can be considered as reliable based on the correlation coefficient values 0.748 to 1.000.

11 Final survey form

The final survey form is developed by including the scope and objectives of the project as the preamble to the questionnaire. Then, the following seven sets of questions with respect to the study under suitable titles and instructions are given:

- General company related details
- Environmental relevant details of the product and process
- Environmental protection practices
- Sustainable innovation practices
- Indicators for
o Social performance
o Economic performance and
o Socio-economic performance

Postal mail format is given in Annexure III. The Electronic Format of the developed final survey form (Questionnaire) is available at the following link:

https://docs.google.com/spreadsheet/viewform?formkey=dE9hN ENGNjBZcEc3QkQ3TE9uRkdVRWc6MQ

12. Conclusion

This paper depicts the development of a new questionnaire for the project "Exploration and Development of Environmental Regulation Management Systems for Indian Manufacturing Industries", which is aimed to evolve policy guidelines. During the process development, each and every phase of the questionnaire design is carefully framed based on the guidelines, experiences of the domain knowledge people and literature survey. The pre-tests, which are critical for the acceptance of any new questionnaire, are carried out with sufficient number of samples collected from industries for this new questionnaire. The pre-tests confirm the acceptance of the questionnaire in its current form. The developed questionnaire can be used for macro level studies, which is sufficient to fulfill the project objective of establishing the relationship between the performance of Indian Manufacturing Industries with respect to Environment Regulations (ER) and Sustainable Innovation Practices (SIP). However, micro studies, such as study the impact of every factors of ER and SIP on the performance of industries in different dimensions, may require to evaluate the contents and their wordings of each and every question needed and sub subsequently, the questionnaire may be fine tuned. Moreover, the questionnaire is prepared in two forms: Printed (Postal mail) and Electronic (e-mail). The electronic mode of reaching respondents is more convenient. Since, the feedback of the respondents is received automatically in a spreadsheet, once the respondents submit their answer. The electronic form is much suitable for analysis. The respondents' opinion may be obtained cent percent through electronic mode of survey in future.

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Annexure I
GDP Growths by Sector - Indian Economic Advisory Council

	Annual Rates	Year on year rates of growth In per cent						
		2005-06	2006-07	2007-08	2008-09	2009-10 QE	2010-11 Rev	2011-12 Proj.
1.	Agriculture & allied activities	5.1	4.2	5.8	-0.1	0.4	6.6	3.0
2.	Mining & Quarrying	1.3	7.5	3.7	1.3	6.9	5.8	6.0
3.	Manufacturing	10.1	14.3	10.3	4.2	8.8	8.3	7.0
4.	Electricity, Gas & Water Supply	7.1	9.3	8.3	4.9	6.4	5.7	7.0
5.	Construction	12.8	10.3	10.7	5.4	7.0	8.1	7.5
6.	Trade, Hotels, Transport, Storage & Communication	12.2	11.6	11.0	7.5	9.7	10.3	10.8
7.	Finance, Insurance, real Estate & Business Services	12.7	14.0	11.9	12.5	9.2	9.9	9.8
8.	Community and Personal services	7.0	2.9	6.9	12.7	11.8	7.0	8.5
9.	**Gross Domestic Product (factor cost)**	**9.5**	**9.6**	**9.3**	**6.8**	**8.0**	**8.5**	**8.2**
10.	Industry (2+3+4+5)	9.7	12.2	9.7	4.4	8.0	7.9	7.1
11.	Services (6+7+8)	11.0	10.1	10.3	10.1	10.1	9.4	10.0
12.	Non - Agriculture (9-1)	10.5	10.8	10.1	8.2	9.4	8.9	9.0
13.	**GDP (factor Cost) per capita**	**7.8**	**7.8**	**7.6**	**5.0**	**6.2**	**6.8**	**6.4**
		Some Magnitudes						
14.	GDP at factor cost - 2004/05 prices in Rs. Lakh Crore (or Trillion)	32.5	35.7	39.0	41.6	44.9	48.8	52.8
15.	GDP market & current prices in Rs. Lakh Crore (or Trillion)	36.9	42.9	49.9	55.8	65.5	78.8	89.8
16.	GDP market & current prices in US$ Billion	834	949	1,241	1,223	1,385	1,732	1,994
17.	Population in Million	1,108	1,126	1,145	1,164	1,183	1,202	1,222
18.	GDP market prices per capital current prices	33,317	38,117	43,554	47,975	55,384	65,517	73,460
19.	GDP market prices per capita in current US $	753	842	1,084	1,051	1,171	1,441	1,632

Source: Indian Economic Advisory Council

Annexure II
Environmental Legislations

S.No	Govt Regulation	Pollution type
1.	Regulation of production and consumption of ozone depleting Substances	Air Legislation
2.	1.The Batteries (Management and Handling) Rules, 2001 2.The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000	Chemical Legislation
3.	Conservation of Energy Act	Energy Legislation
4.	Dumping and disposal of fly ash discharged from coal or lignite based thermal power plants on land	Land Legislation
5.	Noise Pollution (Regulation & Control) Rules, 2000	Noise and Statutory Nuisance Legislation
6.	1.The Recycled Plastics Manufacture and Usage Rules, 1999 2.The Recycled Plastics Manufacture and Usage (Amendment) Rules,2003	Pollution Prevention & Control (PPC) Legislation (including IPC)
7.	Radioactive / Hazardous waste handling	Radioactive Substances Legislation
8.	i. Waste (Management, Handling and Transboundary Movement) Second Amendment Rules, 2009 -- Draft Rules ii. Hazardous Wastes (Management and Handling) Amendment Rules, 2003 iii. The Hazardous Wastes (Management and Handling) Amendment Rules, 2000 iv. The Municipal Solid Wastes (Management and Handling) Rules, 2000 v. The Bio-Medical Waste (Management and Handling) Rules, 1998	Waste Legislation
9.	The water (prevention and control of pollution) cess (amendment) act, 2003	Water Legislation
10	The 2-T Oil (Regulation of Supply and Distribution) Order, 2006	No person shall sell or agree to sell or otherwise dispose of loose 2-T oil
11	Waste handling and management act	Safe storage and import of hazardous chemical

Source: http://www.indiastat.com

Annexure III
Postal Mailing Format of ERMS Questionnaire
Study on the Performance of Indian Manufacturing Industries with respect to Environment Regulations and Sustainable Innovative Practices

Department of Mechanical Engineering of xxxxx is doing a socially relevant research on the Development of Environmental Regulation Management System (ERMS) for the success of Indian Manufacturing Industries with the sponsorship of yyyyy.

This research aims to evolve policy guidelines towards setting Environmental Regulation Management System (ERMS) for Indian Manufacturing Industries. This requires detailed study on three main aspects:

- Collection of the relevant data with respect to process, strategies and performance
- Identification of the key indicators of sustainability and development of Composite Sustainable Performance Index (CSPI) to assess the performances of the industries incorporating economic, social and socio-economic aspects
- Sustainable Performance Analysis of Environmental Practices in Indian manufacturing industries to evolve best ERMS practices to each sector of manufacturing industry.

The outcome of this project would assist industrial policy makers for setting up of environment regulations and implementing best innovative practices to improve performance of manufacturing industries without compromising societal concerns. This study requires an accurate database to meet the above objectives and outcome. In this connection, a questionnaire is developed to acquire data. We request you to kindly support this socially significant national project by your participation through answering this questionnaire. It would take approximately 10 minutes to complete all sections. As an incentive of appreciation, you will have an opportunity to receive a summary of the report. All the answers will be held strictly confidential and anonymous, since your contact information will not be linked to the answers you give.

Thanking you in advance for your valuable feed back

Respondent's Details

Name		
Age		
Name of the industry		
Current Designation		
Other Designations worked		
Experience in number of years	In present company	
	Total	
Educational Qualification (Sort from Highest to lowest)		

General (A): Company Details

S.No	Particulars	Your Feed Back (by providing √ Mark)				
A1.	Location	Tropical	Hill station	Coastal	Plains	River Basin
A2.	Zone	Rural Area	State Industries Promotion Corporation	Export Processing Zone	Special Economic Zone	Technology Park
A3.	No of employees	1-50	51-100	101-200	201-500	≥ 501
A4.	Work force	Contract (C)	Temporary (T)	C + P	T + P	Permanent (P)
A5.	Market area	State(S)	Regional(R)	National(N)	Inter National(I)	Both (N + I)
A6.	Regulatory body	Industrial Association	local	State	Central	International
A7.	Certification	BIS	ISI	EU / UN	ISO	Non-standard

(B) Categorization of Product / Process Details

S.No	Particulars	Your Feed Back (by providing √ Mark)				
B1.	Nature of Waste	Non recyclable	Recyclable	Partial recyclable	Negligible Waste	Zero waste
B2.	Quantum of Emission by the product expressed as % of fuel consumption	≥ 50%	50-21%	20-6%	5-1%	≤ 1 %
B3.	Quantum of effluent (Toxic Substances) resulted by the process expressed as % of processing material	≥ 50%	50-21%	20-6%	5-1%	≤ 1 %
B4.	Environment regulations governing the process/ product	Air pollution act	Soil pollution act	Water pollution act	Industrial waste act	Environmental protection act
B5.	Pollution Impact	Air	Soil	Water	Man Kind	Ozone layer
B6.	Water Source	River/lake	Ground water	Rain water	Municipal water	Other

Suggestions for the inclusion of any salient missing particulars/details

Table V(C) Environmental / Sustainable Practices

S.No	Particulars	Your Feed (by providing √ Mark)				
C1.	Training on ERMS to employees	Yearly	Half yearly	Quarterly	Bimonthly	Monthly
C2.	Frequency of environmental practices Audit	Yearly	Half yearly	Quarterly	Bimonthly	Monthly
C3.	Environmental Management System	NIL	Green Manufacturing	Cleaner Production	In Campus ETP/STP plants	ISO 14000
C4.	Proportion of employees involved in R&D activities	≤ 1 %	1%-5%	6%-15%	16%-30%	≥ 30%
C5.	Proportion of Expenses from turn over for R&D activities	≤ 0 %	1%-5%	6%-20%	21%-50%	≥ 50%
C6.	Quality/ Management Practices	Six sigma	Product chart	EOQ	Zero defect	Eco Friendly

Table V (D) Economic Performance

S.No	Particulars	Your Feed (by providing √ Mark)				
D1.	Income / profit	Poor	Below average	Average	Above average	Excellent
D2.	Production	Poor	Below average	Average	Above average	Excellent
D3.	Turn over	Poor	Below average	Average	Above average	Excellent
D4.	Return on Investment	Poor	Below average	Average	Above average	Excellent
Average during last five years: Poor = -30 %≤ , Below average = -29% to -6%, Average = -5 %to 5%, Above average = 6%-29%, Excellent = ≥ 30%						

Table V (E) Societal Performance

S.No	Particulars	Your Feed (by providing √ Mark)				
E1.	Increase in Literacy Rate	Very Low	Low	Medium	High	Very High
E2.	Drop in Accidental Rate	Very Low	Low	Medium	High	Very High
E3.	Fall in Crime Rate	Very Low	Low	Medium	High	Very High
E4.	Decline in Patient admissions in hospitals	Very Low	Low	Medium	High	Very High
Proportional Change during last five years: Very low = -30 %≤ , Low = -29% to -6%, Medium = -5 %to 5%, High = 6%-29%, Very High = ≥ 30%						

Table V (F) Socio-Economic Performance

S.No	Particulars	Your Feed (by providing √ Mark)				
F1.	Per capita income increased every year	Very probably not	Probably not	Probably	Very probably	Definitely
F2.	Transport and communication facilities has improved	Very probably not	Probably not	Probably	Very probably	Definitely
F3.	Regularity of the employee is good	Very probably not	Probably not	Probably	Very probably	Definitely
F4.	Unity and Morale of the employees are high	Very probably not	Probably not	Probably	Very probably	Definitely
Proportion change during last five years: Very probably not = -30 %≤ , -29% to -6% = Probably not, -5 %to 5% = Probably, 6%-29% = Very probably,≥ 30% =Definitely						

Suggestions for the inclusion of any salient missing particulars/details

Once again, thanking you for your kind support