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PERFORMANCE MEASURES FOR CEMENT INDUSTRY IN INDIA: A CASE STUDY ANALYSIS

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ABSTRACT

Purpose: The purpose of this paper is aimed at development and validation of an instrument for factor analysis implementation in cement industry of India. It provides consolidation of the quality literature by identifying 11 performance measure factors of analysis.

Design/Methodology/Approach: The paper presents the case study approach of current green manufacturing strategies of cement companies and provides the Industrial Environmental Impact Data Collection, Design & Control of Manufacturing Systems and Integration-Product & Manufacturing system with questionnaire with employees, top and middle managers in fourteen cement factories.

Findings: It has been found that the fourteen factories under investigation have low productivity and production levels when compared with the design values. There is no clear TPM strategy and it has been found that the lack of training and personal development is the main cause of this problem. In addition, employees are found not to be motivated because of the lack of a management strategy and reward structure.

Research Limitations/Implications: Based on the findings, a new framework for GM has been developed. A broad range of survey and research was reviewed, and all revealed the methods to recognize the key influences for development of green technology. The characteristics examined are firm size, the degree of capital intensity, the degree of diversification, the timing of TQM implementation, and the maturity of the program. We find that smaller firms do significantly better than larger firms do.

Practical Implications: The current challenges have been identified and comparative analysis is developed into a model for the implementation of Green manufacturing.

Originality/Value: The paper highlights limitations in some of the cement factories in relation to GM and production strategies. The importance of adopting a realistic strategy and framework by managers is discussed. The results for size and capital-intensity validate the importance of TQM practices for smaller firms and environments that are more frequent intensive. Investing to achieve a broader, deeper, and more mature TQM implementation (possibly by targeting an independent TQM award) should also result in higher benefits from TQM implementation. These measures can be used to assess the status of factor analysis, in order to imply further development.

KEYWORDS: Green Manufacturing, Cement Industry, Total Quality Management, TQM, Performance Measures, PMs, Quality Management

1. INTRODUCTION

The world consumption of cement is rising at an increasing rate creating significant levels of pollution and recently, there is a growing scepticism among consumers about the validity of "green" product claims (Irene J. Petricka and Ann E. Echols, 2004). The issue with environmental destruction has been one of the main problems both social and political in recent times and concerns about the sustainability and the protection of the natural environment have become increasingly significant issues amongst regulators, environmentalists and society in many countries. Sustainability is a significant issue, which has been discussed in recent years, and a large number of sustainability reports, exhibiting the increased significance of sustainability issues and environmental management programs were organized to ensure the implementation of the environment friendly concept by employees (Ibrahim Dincer and Sadik Dost, 1996). Therefore, companies can earn a green passport for a greater market, the use of such environmental management practices presents new needs of information for public organizations, and they need information about their environmental impacts and the results of the initiatives that are developed.

The environmental management becomes our every day's care and increasingly numerous people care for the environment we live in and implementing an EMS can aids corporations improve their performance and also the purpose of the ISO 14001 standard is to guide environmental improvements worldwide through a systematic approach to environmental management and ISO 14001 is a systemic requirement directed to changing business processes and procedures (I. P. S. Ahuja and J. S. Khamba, (2008)). This research defines the concept of environmental management systems for the cement industry and in this study; we have used TOPSIS method to recognize the most effective criteria of ISO 14001-based environmental management system (EMS) and ranking cement industries in Iran. This paper is organized as follows: Section 2 discusses the basics of sustainability, ISO 14001 and its benefits and EMS systems in cement industries, Section 3 discusses the important success factors of ISO 14001 implementation, Section 4 discusses the methodology, Section 6 discusses the study and Section 7 concludes the study.

Challenges for TQM Implementation with Performance Measures in Indian Manufacturing Industry

As the organizations across the globe have faced stiff cutthroat competition in the last three decades, the Indian industry too could not escape the brunt of globalization. Indian manufacturing industry has also witnessed irrepressible competition in the recent times, predominantly due to the entry of multinational companies in the wake of liberalization, since early 1990's (Juan Cagiao, (2011)). Owing to opening up of the Indian economy from merely a regulated economy, the manufacturing industry has been faced with uphill task of competing with the best in the world. The intense competition has been witnessed in terms of low costs, improved quality and products with high performance, competition (M. Z. Soguta, (2009)). Moreover shorter lead times, shorter innovation times and reduced inventories have led to increasing demands on the organization's preparedness, adaptability and versatility. Performance measures quantitatively tell us something important about our products, services, and the processes that produce them. They are a tool to help us understand, manage, and improve what our organizations do.

They provide us with the information necessary to make intelligent decisions about what we do. A performance measure is composed of a number and a unit of measure. The number gives us a magnitude (how much) and the unit gives the number a meaning (what) (M.B. Alia, (2011)). Performance measures are always tied to a goal or an objective (the target). Performance measures can be represented by single dimensional units like hours, meters, nanoseconds, dollars, number of reports, number of errors, number of CPR-certified employees, length of time to design hardware, etc (M.D. Singh, (2006)). They can show the variation in a process or deviation from design specifications. Single-dimensional units of measure usually represent very basic and fundamental measures of some process or product. More often, multidimensional units of measure are used. Measures expressed these performances as ratios of two or more fundamental units. These may be units like miles per gallon (a performance measure of fuel economy), number of accidents per million hours worked (a performance measure of the companies safety program), or number of on-time vendor deliveries per total number of vendor deliveries (Nimawat Dheeraj and Namdev Vishal, (2012)). Performance measures expressed this very usually convey more information than the single-dimensional or single-unit performance measures. Ideally, performance measures should be expressed in units of measure that are the most meaningful to those who must use or make decisions based on those measures.

The rest of the paper is organized as follows: a brief review of researches related to the proposed technique is presented in section 2. Section 3 describes proposed method for ANN based leak detection in pipeline. The detailed experimental results and discussions are given in section 4. The conclusions are summed up in section 5.

Related Work

Though a plenty of related works are available in the literature, a concise number of works are reviewed just below.

M.D. Singh *et al.* [21] have proposed Knowledge management (KM) involves strategies and processes of identifying, capturing, and leveraging knowledge to enhance competitiveness. In this proposed method, knowledge-based organizations was distinguished from the organizations of the last millennium by its emphasis on monitoring and controlling the organization by shared knowledge derived from internal and external data sources. The objective of this paper is to understand the KM practices in Indian manufacturing organisations, which are going through a major transition in this area. In this approach was reported the findings of a postal survey carried out to access the impact of KM practices in Indian manufacturing industries. Data were collected and analysed for 71 industries under this category. Aleksander Janes *et al.* [23] have explored and clarified the cause and effect relations between key performance indicators (KPIs) which significantly contribute to the benefits of the business processes exploitation.

In this proposed method, they developed a single equation microeconomic error correction model (ECM) with the Engle and Granger two-step method. With the ECM approach, the performed method application on the KPIs and estimated short- and long-term effects between them. They was recognized that the total turnover has been increased, by increased maritime throughput. In this research study: sample size and quality of the data that were available and the quantitative analysis in the four perspectives of the Kaplan and Norton’s balanced scorecard (BSC). They presented quantitative approach was useful in combination with a qualitative approach, which was a common practice in determining the causal relations resulting in the strategic map of BSC. Simulations of the developed model are possible on all levels of management, by combining the KPIs, and consecutively acquire new knowledge about their relations. Sushil Kumar *et al.* [23] have proposed a method to discuss and analyse the entrepreneurial process in Indian seed business and factors affecting entrepreneurship in this sector. In this proposed work, they were described descriptive and relational data-analytic methods were adopted such as frequency distribution, cross tabulation, and correlation analysis. These study findings have implications for policy makers as well as for prospective entrepreneurs. They proposed original and value loaded in the sense that this provides the practical implications for understanding the entrepreneurial process in a very critical segment of the agriculture sector. I.P.S. Ahuja *et al.* [24] have evaluate the challenges before Indian manufacturing organizations for adapting to proactive total productive maintenance (TPM) initiatives. They introduced Indian manufacturing organizations to formulate the Performance measures and enablers for overcoming obstacles to successful TPM implementation with regard to its preparedness to face global challenges. The study highlights the difficulties faced by Indian manufacturing organizations in their attempt to implement TPM initiatives in order to improve organizational efficiency. In this proposed method, they implemented TPM was by no means an easy task, which is heavily burdened by organizational, cultural, behavioural, technological, operational, financial, and departmental barriers. They need to study stresses the need for improving the synergy between the maintenance function and other organizational quality improvement initiatives in the organizations, to establish maintenance as a competitive strategy for meeting the challenges of a highly competitive environment. Ayoob Ahmed Wali *et al.* [25] have presented economic context of liberalization and globalization, Indian organizations face many challenges. The Indian software industry has been recognized globally for its competitiveness built upon quality attributes such as timeliness and reliability of delivery. In this proposed method, they studded carried out in one of the leading software organizations in India involved in developing a range of application software for banks, insurance companies, and financial houses.

The case study work involved a survey identifying the Performance measures for TQM, and identifying how the company adopts various principles and techniques of quality management. Darshak A. Desai *et al.* [26] have purposed the results from an empirical investigation of Six Sigma status in Indian industry, especially to highlight Performance Measures (PMs) of Six Sigma implementation in a developing economy like India. In this proposed work, they was studied based on survey questionnaire suitable for Indian industries. In this proposed method, they was provided value to academics, researchers and practitioners of Six Sigma by way of providing insight into the PMs for Six Sigma implementation, especially in Indian industries. Moreover, a detailed impact of different PMs of Six Sigma implementation in Indian industry by means of semi-structured interviews could not be executed due to above constraints. Harjeev K. Khanna *et al.* [27] have reviewed Performance measures (PMs) of total quality management (TQM) to rank these in the Indian manufacturing industry. In this proposed method for PMs, Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) was used. The data were collected using questionnaires as the research instrument. To process management, top management leadership and customer focus are the top three factors for implementation of TQM in the manufacturing industry in India. Quality citizenship is a relatively low-ranked factor. In this proposed work, they used of TOPSIS approach to rank the PMs of TQM.

Table 1: List of PMs as Recommended by Various Authors for Total Quality Management in Green Manufacturing for Indian Cement Industry

Authors/critical factors	*Quality Performance*	*Resource Conservation*	*Financial Performance*	*Innovation Performance*	*Cost Performance*	*Green Regulations / Standardization*	*Enhanced Productivity and Competitive Advantage*	*Employee Satisfaction Performance*	*Customer Satisfaction*	*Technology and Environmental Indicators*	*New Sources of Revenue*
M.D. Singh *et al.* [21]	*X*		*X*			*X*	*X*		*X*		
Aleksander Janes *et al.* [22]		*X*	*X*			*X*		*X*	*X*	*X*	*X*
Sushil Kumar *et al.* [23]	*X*	*X*			*X*		*X*	*X*			*X*
I.P.S. Ahuja *et al.* [24]			*X*	*X*	*X*	*X*	*X*		*X*	*X*	*X*
Ayoob Ahmed Wali *et al.* [25]	*X*	*X*		*X*		*X*	*X*	*X*		*X*	
Darshak A. Desai *et al.* [26]		*X*		*X*		*X*		*X*		*X*	
Harjeev K. Khanna *et al.* [26]	*X*	*X*	*X*		*X*		*X*	*X*	*X*		*X*

Table 2: List of Items as Performance Measures That Influence TQM Implementation

Performance Measures	
Quality Performance	Quality of products; Quality of process; Quality culture improvement; The quality of relationships with suppliers; The quality of relationships with customers; Material controlled in such a fashion so as to prevent mixing and to ensure traceability throughout production/processing.
Resource Conservation	Techno-economic feasibility/ variability; Easy access to finance; Low emitting raw materials; Environmental compliance; Packaging with recycled content.
Financial Performance	The reputation of organization; Increasing the trust among the cluster members; Strengthening of the local industry association; Customer satisfaction; Market Share; Brand Management; Expenditure on Marketing; Expenditure on Advertising; Price- Earnings Ratio; Book Value per Share with Market Share.
Innovation Performance	Specialization of labors; Specialization of suppliers improved; Specialization of service providers; Value creation due to proximity; Improvement in adoption of innovative technology.
Cost Performance	Direct maintenance cost/Added value; Direct maintenance cost/Replacement value; Cost of maintenance personnel/Direct maintenance cost; Cost of subcontracting/Direct maintenance cost; Cost of spare parts and current maintenance items/Direct maintenance cost.
Green Regulations / Standardization	Better adaptability to changing environmental regulations and legislation; Reduced environmental liabilities; Benchmarking of green processes establishes; Better Image (Green image) of company, Waste & pollution minimization; Reduced resource needs; GM leads to safer and cleaner factories, worker protection; Portray as green manufacturers.
Enhanced Productivity and Competitive Advantage	GM led to higher productivity, profitability, cost savings and competitiveness; More sales, higher margin, better resource utilization, waste minimization, ultimately reduces operating cost, Green design improved product quality at lower cost, better public image, and higher productivity.

Table 2: Contd.,

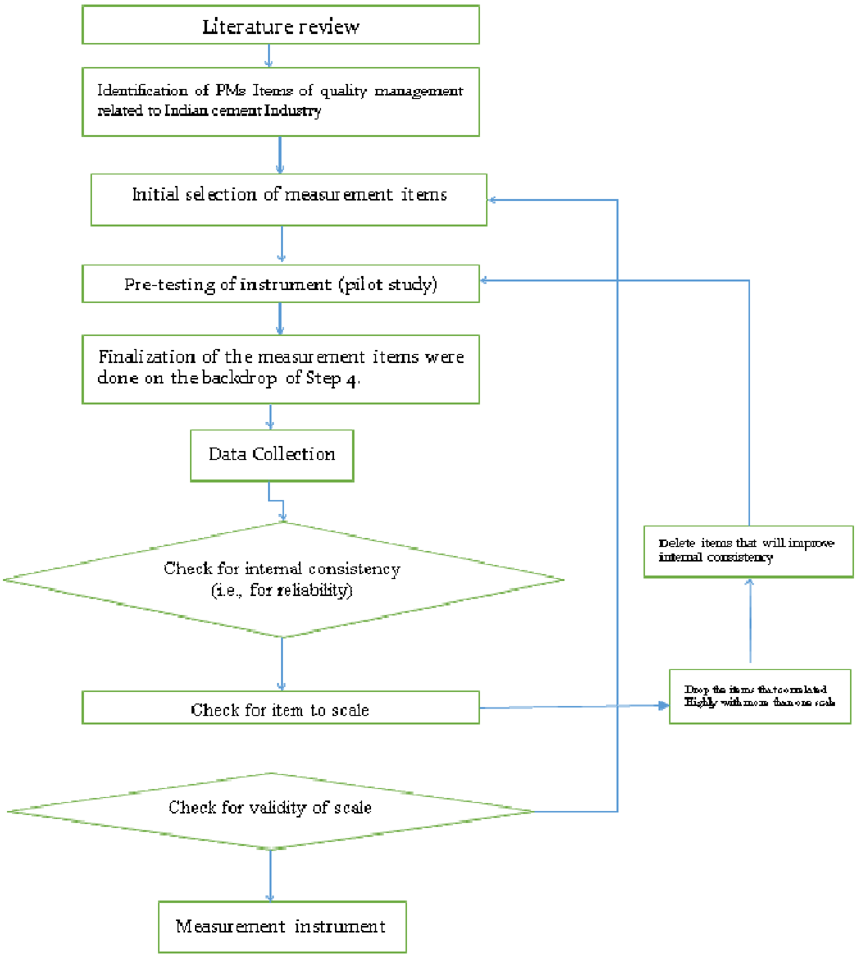
Employee Satisfaction Performance	Employees are kept up-to-date on organizational changes. This organization pays well compared to other organizations. The benefits package this organization offers. The co-operation those outside departments; Management is supportive of its employees.
Customer Satisfaction	Customer Satisfaction Studies; Techniques for Measuring Customer Satisfaction; Award for Customer Satisfaction.
Technology and Environmental Indicators	Technology Strategy; Import or In-House Development; R & D Expenditure; Number of Production Plants; Product Differentiation (brands); Grades of Ordinary Portland Cement Produced.
New Sources of Revenue	Financial and environmental performances; Reduced financial and environmental liabilities; GM opens new sources of revenue through market opportunities; Process modification and Innovation instituted better controls on GM operating conditions.

4. RESEARCH OBJECTIVES AND METHODOLOGY

The basic objective of this study was to analyse the Performance measures (PM) of factor analysis implementation in Indian cement industries. The objective was to carry out exploratory empirical investigation of a cross sectional study of PMs of factor analysis implementation for different sizes and sectors of Indian cement industries (P. Van den Heede, (2012)). To make the study exhaustive, entire spectrum of Indian cement industries were considered as population for the study. The study was not designed just to look at different issues of existing methods but also find out the importance of existing method’s review practices. Rather than considering researcher alone, the study aimed to survey outcome of correction and regression analysis for cement industry (P. Duxson, (2007)). The PMs used in this study were derived from existing literature review of Total Quality Management and factor and recreation analysis. In this paper, we are presenting the list of 11-major PMs Factor with their sub elements as generated from the literature review.

In this section, we discuss about the proposed a new PM model building a new rule based on a belief structure and for inference in the rule based system green manufacturing. The methodology is referred to as a proposed PM model using the evidential reasoning approach.

Finally, the issue of how the gains from TQM vary by firm characteristics has not yet been extensively explored in the literature. Our research makes an initial effort to explore this issue. Section 2 develops the hypotheses examined in this paper. Section 3 describes sample selection and issues related to methodology. Section 4 describes the main empirical results and various sensitivity analyses. The final section summarizes the paper.



Data Source

The data has been collected from both primary and secondary sources. The primary source consists of a questionnaire survey 450 structured questionnaires had distributed to the respondents throughout the world for gathering needed data. The questionnaire is included questions to address the stated research objectives (Paul B. Stretesky, (2009)). All the questions have designed in such a way that the responses generated on the crucial issues, which are directly and indirectly focused on the research goals. This data helps in making projections in this research investigation in cement industry. The secondary source is also included scanning and searching of related past works in print form and electronic form on websites.

Sampling Data Procedure

In the present research, a sample size of 500 (collected from all over India) was chosen for the final survey. However data collection through questionnaire method has several advantages but it also have so many disadvantages like Low rate of return of the duly filled in questionnaires; bias due to no-response is often indeterminate; It can be used only when respondents are educated and cooperating; The control over questionnaire may be lost once it is sent; There is also the possibility of ambiguous replies or omission of replies altogether to certain questions; interpretation of omissions is difficult and last but not least this method is likely to be the slowest of all (Paul S Phillips, (2001)). To overcome all above difficulties following care has been taken to ensure good response. The questionnaire was mailed along with prepaid envelop in order to facilitate quick reply. Close friends and associates were identified in each area and the questionnaire was explained to them Shonali Pachauri, (2002) Sushil Kumar and Jabir Ali, (2010). They were entrusted with the responsibility to answer the queries of the respondents and to do follow up. To start with, the rate of return of the complete questionnaire was very fast, but when the rate of flow slowed down, reminders were sent to them for an early reply (R. Rehan, (2007)). Telephone calls and e-mail were also made besides personal contacts with the organization. The hectic efforts and the support of the friends and institutes generated a good response representing 48% response rate, which was quite encouraging.

Reliability of Experiential Process

In this section, we have to analysis the respondent to questionnaire were organized, fed into a variable computer data and analysed for internal consistency analysis. The data was analysed using IBM SPSS Software. The factor analysis of a questionnaire determines its ability to yield consistent results. Reliability was operational as internal consistency, which is the degree of inter correlation among the item which comprise a scale. Internal consistency can be established using a reliability coefficient such as Cronbach's alpha. Alpha is the average of the correlation coefficient of each item with each other item. The Cronbach's alpha of questionnaire with 81 attributes/items was found to be 0.992, implies that the questionnaire is reliable. Also the reliability of individual scales was tested found to be varied 0.892 to 0.895. Since the reliability coefficients of all the individual scales are above 0.7 considered adequate, all the developed scales indicated acceptable reliability

Table 3

Factor No.	Factors Based on Survey Result	Cronbach's A	KMO	Average Variance Explained by These Factors (Cumulative)
Fac-1	Quality Performance	.920	.670	4.856609375
Fac-2	Resource Conservation	.892	.696	5.606968254
Fac-3	Financial Performance	.962	.777	5.95421875
Fac-4	Innovation Performance	.892	.658	6.022328125
Fac-5	Cost Performance	.959	.661	4.68928125
Fac-6	Green Regulations /Standardization	.890	.500	4.721359375
Fac-7	Enhanced Productivity and Competitive Advantage	.886	.652	6.525
Fac-8	Employee Satisfaction Performance	.921	.558	5.1893125
Fac-9	Customer Satisfaction	.993	.649	4.78859375
Fac-10	Technology and Environmental Indicators	.911	.751	4.8841875
Fac-11	New Sources of Revenue	.972	.500	5.725984375

The collected data was analyzed (using SPSS 18.0 software) by following factor analysis procedure as suggested by [28]. Factor Analysis is a general name denoting a class of procedure primarily used for data reduction and summarization. In research survey, there may be a large number of variables, most of them are correlated and which must be reduced to a manageable level and interpretable. The first step, prior to running the factor analysis, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's test of sphericity were conducted. The KMO value was found to be 0.787 (Table 5) which is sufficiently large (>0.5), which indicated sample adequacy for factor analysis, and supporting the appropriateness of using factor analysis to explore the underlying attributes. The Bartlett's test of sphericity was highly significant ($p < 0.000$) significance value of Bartlett's test is 0.000, rejecting the null hypothesis that the 91 important attributes are uncorrelated in the population.

Communalities

The communalities of the data is reported greater than 0.6 for all the items of the scale. Communality referred to as the percentage of total variance explained by the common factors. Communalities represent the proportion of the variance in the original variables that is accounted for by the factor solution (Rene van Berkel, (2008)). The factor solution should explain at least half of each original variable's variance, so the communality value for each variable should be 0.60 or higher (R H Williams, (1987)). This term may be interpreted as a measure of 'uniqueness'. A low communalities figure indicates that the variable is statistically independent and cannot be combined with other variables. In our instrument the communalities value is more the 0.70 (Table 6). Hence, we can conclude that all the initial items selected which are responsible for TQM in technical education are dependent with each other and focusing on common issue.

Table 4: Communalities for PM

S. No.	Attribute:	Initial	Extraction
1.	Extent to which the quality of products are improved	1.0000	.784
2.	Extent to which the quality of process are improved	1.0000	.784
3.	Quality culture improved	1.0000	.784
4.	Extent to which the quality of relationships with suppliers are improved	1.0000	.778
5.	Extent to which the quality of relationships with customers are improved	1.0000	.780
6.	Material controlled in such a fashion so as to prevent mixing and to ensure traceability throughout production/processing	1.0000	.776
7.	Defective materials properly identified, segregated from acceptable material and held in a controlled area pending disposition	1.0000	.782
8.	Inspection and test equipment periodically inspected and calibrated	1.0000	.792
9.	The calibration system conform to the requirements of MIL-STD-45662 or ISO 10012	1.0000	.786
10.	A system to assure traceability both to receiving records and usage records	1.0000	.791
11.	Techno-economic feasibility/ variability	1.0000	.783
12.	Easy access to finance	1.0000	.786
13.	Use of low emitting raw materials	1.0000	.785
14.	Environmental compliance	1.0000	.786
15.	Packaging with recycled content	1.0000	.783
16.	Extent to which the reputation of organization is enhanced	1.0000	.777
17.	Increasing the trust among the cluster members	1.0000	.785
18.	Strengthening of the local industry association	1.0000	.780
19.	Customer satisfaction improved	1.0000	.782
20.	Market Share	1.0000	.778
21.	Department for Brand Management	1.0000	.779
22.	Number of Dealers/ Stockist	1.0000	.780
23.	Expenditure on Marketing	1.0000	.784
24.	Expenditure on Advertising	1.0000	.773
25.	Earnings per Share	1.0000	.780
26.	Price- Earnings Ratio	1.0000	.776
27.	Book Value per Share	1.0000	.783
28.	Market Share	1.0000	.782
29.	Specialization of labors enhanced	1.0000	.783
30.	Specialization of suppliers improved	1.0000	.785
31.	Specialization of service providers improved	1.0000	.783
32.	Value creation due to proximity	1.0000	.780
33.	Improvement in adoption of innovative technology	1.0000	.780
34.	Improvement in capacity utilization of industries	1.0000	.777

35.	Direct maintenance cost/Added value of production	1.0000	.787
36.	Direct maintenance cost/Replacement value of assets	1.0000	.781
37.	Cost of maintenance personnel/Direct maintenance cost	1.0000	.786
38.	Cost of subcontracting/Direct maintenance cost	1.0000	.783
39.	Cost of spare parts and current maintenance items/Direct maintenance cost	1.0000	.787
40.	Better adaptability to changing environmental regulations and legislation	1.0000	.781
41.	Reduced environmental liabilities	1.0000	.781
42.	Benchmarking of green processes establishes standards for comparisons	1.0000	.781
43.	Better Image (Green image) of company , green organization culture	1.0000	.778
44.	Competition amongst companies to portray as green manufacturers	1.0000	.787
45.	Waste & pollution minimization	1.0000	.790
46.	Reduced resource needs	1.0000	.790
47.	GM leads to safer and cleaner factories, worker protection, reduced future costs for disposal	1.0000	.782
48.	Competition amongst companies to portray as green manufacturers	1.0000	.786
49.	GM led to higher productivity, profitability, cost savings and competitiveness	1.0000	.786
50.	More sales, higher margin, better resource utilization, waste minimization, ultimately reduces operating cost, enhances profit & productivity	1.0000	.785
51.	Better perception about GM product	1.0000	.786
52.	Green design improved product quality at lower cost, better public image, and higher productivity	1.0000	.790
53.	GM comes to be more responsible and a more profitable way to do business	1.0000	.787
54.	Efficient use of financial resources, technological knowledge, and operations to implement GM practices led to competitive advantage	1.0000	.786
55.	GM provides management an opportunity to differentiate themselves from their peers and enhance their competitive advantage.	1.0000	.781
56.	Frank and two-way communication between management and employees	1.0000	.785
57.	Legal, ethical, and societal responsibilities to its key communities	1.0000	.781
58.	Finalization of strategies using comparative benchmarking	1.0000	.791
59.	Long term goal setting on the basis of current performance	1.0000	.784
60.	Providing technical guidance to suppliers	1.0000	.781
61.	Supplier selection based on quality	1.0000	.784
62.	Supply chain greening & optimization	1.0000	.773
63.	Reverse Logistic program reduces the consumption of virgin material	1.0000	.782
64.	Overall, information in this organization is communicated well.	1.0000	.783
65.	This organization listens to the ideas/opinions that employees contribute.	1.0000	.787
66.	Employees are kept up-to-date on organizational changes in policy or practice.	1.0000	.791
67.	This organization pays well compared to other organizations.	1.0000	.789
68.	I am satisfied with the benefits package this organization offers.	1.0000	.783
69.	I feel secure about my continued employment at this organization.	1.0000	.782
70.	I believe my career aspirations can be achieved at this organization.	1.0000	.786
71.	I feel recognized for the contribution I make to this organization.	1.0000	.781
72.	I get the co-operation I need from those outside my department.	1.0000	.779
73.	Management is supportive of its employees.	1.0000	.781
74.	Employee performance evaluations are fair and appropriate	1.0000	.782
75.	Opportunities for Growth	1.0000	.783
76.	The environment in this organization supports a balance between work and personal life.	1.0000	.781
77.	The organization's policies for promotion and advancement are always fair.	1.0000	.777
78.	Respect for Employees	1.0000	.786
79.	Customer Satisfaction Studies	1.0000	.780
80.	Techniques for Measuring Customer Satisfaction	1.0000	.784
81.	Award for Customer Satisfaction	1.0000	.787
82.	Technology Strategy: Import or In-House Development	1.0000	.787
83.	R & D Expenditure	1.0000	.780
84.	Number of Production Plants	1.0000	.784

85.	Product Differentiation (brands)	1.0000	.786
86.	Grades of Ordinary Portland Cement Produced	1.0000	.784
87.	Positive effect on financial and environmental performances of firms	1.0000	.784
88.	Reduced financial and environmental liabilities	1.0000	.776
89.	GM opens new sources of revenue through new market opportunities	1.0000	.771
90.	Process modification and Innovation instituted better controls on GM operating conditions	1.0000	.777
91.	Re-creating product and process technology by using innovative thinking.	1.0000	.771

Interpretation of TQM Factors and its Representation

To Measure PMs of Green Manufacturing, Following Main Factors Are Considered

In Factor 1, accounting for 4.856609375 of common variance, is named as 'Quality Performance, which accounts for all those items that form unique resources for a Quality of products. Quality of process; Quality culture improvement; The quality of relationships with suppliers; The quality of relationships with customers; Defective materials properly identified, segregated from acceptable material and held in a controlled area-pending disposition. Inspection and test equipment periodically inspected. MIL-STD-45662 or ISO 10012; these resources create asymmetry and differentiating advantages with respect to other company.

The factor 2, 'Resource Conservation', accounts for 5.606968254 of common variance and includes such elements as Techno-economic feasibility/ variability; Easy access to finance; Low emitting raw materials; it is clearly implicit that training centre and finishing regular curriculum is not sufficient for cement industry to be withstand in this competitive environments but it is also required to providing knowledge beyond the syllabus and training students as per the need of stakeholders.

In the factor 3, 'Financial Performance', explaining 5.95421875 of the common variance, signify an important of the reputation of organization; Increasing the trust among the cluster members; Strengthening of the local industry association; Customer satisfaction; Price- Earnings Ratio; Book Value per Share with Market Share. Employees in the firm will always be willing to help customers; Materials associated with the service will be visually appealing in the firm.

In the factor 4, 'Innovation Performance', accounting for 6.022328125 of the common variance has loading of such items as Specialization of labors; Specialization of suppliers improved; Specialization of service providers; Value creation due to proximity; Improvement in adoption of innovative technology.

In the factor 5, 'Cost Performance', accounting for 4.68928125 of the common variance has loading of such items as direct maintenance cost/added value; Direct maintenance cost/Replacement value; Cost of maintenance personnel/Direct maintenance cost; Cost of subcontracting/Direct maintenance cost; Cost of spare parts and current maintenance items/Direct maintenance cost.

In the factor 6, 'Green Regulations /Standardization', accounting for 4.721359375 of the common variance has loading of such items as better adaptability to changing environmental regulations and legislation. Reduced environmental liabilities; Reduced resource needs; GM leads to safer and cleaner factories, worker protection. Portray as green manufacturers. In present scenario for over all development of any students the exposes to real life training is very much essential and it is only possible when they get corporate training and able to solve their problems.

Table 5: Items to Scale Loaded Under Different Factor

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
1	Quality Performance				4.856609375			
2	Resource Conservation					5.606968254		
3	Financial Performance						5.95421875	
4	Innovation Performance						6.022328125	
5	Cost Performance				4.68928125			
6	Green Regulations / Standardization				4.721359375			
7	Enhanced Productivity and Competitive Advantage						6.525	
8	Employee Satisfaction					5.1893125		
9	Performance				4.78859375			
10	Customer Satisfaction				4.8841875			
11	New Sources of Revenue					5.725984375		

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Table 6

	PM 1	PM 2	PM 3	PM 4	PM 5	PM 6	PM 7	PM 8	PM 9	PM 10	PM 11
PM 1	1										
PM 2	0.895067861	1									
PM 3	0.248421451	0.200429823	1								
PM 4	0.177691564	0.066405797	0.528744654	1							
PM 5	0.454272306	0.563759281	0.597051697	0.406980977	1						
PM 6	0.419136311	0.376047878	0.604418896	0.481896036	0.518158737	1					
PM 7	0.368075713	0.347054086	0.571242707	0.734261652	0.766080559	0.539156347	1				
PM 8	0.43960751	0.462034499	0.603538681	0.458039829	0.730512183	0.616855819	0.7079299	1			
PM 9	0.435059538	0.443593556	0.620598229	0.577552698	0.819213754	0.609999201	0.890219898	0.767310057	1		
PM 10	0.451944481	0.496656268	0.600628765	0.504345127	0.788449588	0.695926144	0.827868064	0.766587397	0.91367524	1	
PM 11	0.456108906	0.52422268	0.555180289	0.429572529	0.784319943	0.631330356	0.817645471	0.730628389	0.903691522	0.960253412	1

In the factor 7, 'Enhanced Productivity and Competitive Advantage', an accounting for 6.525 of the common variance has loading of such items as GM led to higher productivity; profitability, cost savings and competitiveness; More sales, higher margin, better resource utilization, waste minimization, ultimately reduces operating cost, enhances profit & productivity. Better perception about GM product; In the term of long-term performance for GM, products have competitive quality with good reliability, durability and reusability, Ensures brand value enhancement and better regulatory compliance.

In the factor 8, 'Employee Satisfaction Performance', accounting for 5.1893125 of the common variance has Employees are kept up-to-date on organizational changes. This organization pays well compared to other organizations. The benefits package this organization offers. Employment at this organization. The contribution to this organization. The co-operation those outside departments; Management is supportive of its employees. Employee performance evaluations; Opportunities for Growth. In the factor 9, 'Customer Satisfaction', an accounting for 4.78859375 of the common variance has mentation of new technologies. Customer Satisfaction Studies; Techniques for Measuring Customer Satisfaction; Award for Customer Satisfaction. Participation in environmental initiatives, certification programs, applying product innovation, end of life (EOL), cradle-to-cradle and close loop approach for GM.

In the factor 10, ‘Technology and Environmental Indicators’, an accounting for 4.8841875 of the common variance has mentation of new technologies. Technology Strategy; Import or In-House Development; R & D Expenditure; Number of Production Plants; Product Differentiation (brands); Grades of Ordinary Portland Cement Produced. Participation in environmental initiatives, certification programs, applying product innovation, end of life (EOL), cradle-to-cradle and close loop approach for GM.

In the factor 11, ‘New Sources of Revenue’, an accounting for 5.725984375 of the common variance has mentation of new technologies. Financial and environmental performances; Reduced financial and environmental liabilities; GM opens new sources of revenue through market opportunities; Process modification and Innovation instituted better controls on GM operating conditions; Re-creating product and process technology by using innovative thinking. Participation in environmental initiatives, certification programs, applying product innovation, end of life (EOL), cradle-to-cradle and close loop approach for GM.

Detailed Item Analysis

In this paper, we have discussed the method to evaluate the assignment of items to scales. The method considers the correlation of each item with each scale. Specifically the item-score to scale score correlation are used to determine if an item belongs to the scale as assigned. If an item does not correlate highly with any of the scales, it is eliminated.

Table 5: reports the correlation matrix for the eleven scales. All items have correlations of 0.895067861, 0.200429823, 0.528744654, 0.406980977, 0.518158737, 0.539156347, 0.7079299, 0.767310057, 0.91367524 and 0.960253412 with the nine scales in nine factors. Since scale 11 represents the average score obtained from all 91 items; the high correlation between scale 11 and item number 91 was expected. In addition, since item 91 showed relatively smaller correlations with the other scales it was concluded that it had been assigned appropriately to scale 11. As seen in Table 5, all items have high correlations with the scales to which they were assigned relative to all other scales. Hence, it was concluded that all items in this instrument had been appropriately assigned to respective scales.

CONCLUSIONS

In this paper, a challenge has been made to explore green process responsibility for initiating quality management in cement industry and planning for PM in cement industry by evaluating percent analysis. With the analysis result, we are getting a model and result for cement organizational requirements to achieve quality management goals in various arms of cement industrial. In this paper, an attempt has been made to explore PM responsible for initiating quality management in green manufacturing and author have offered a set of 11 PM of quality management in green manufacturing by performing factor analysis. The measure proposed were empirically based and shown to be consistent and effective. The recreation coefficient (alpha) of the initial selected 91 items measure 0.95, which is above 0.7 are considered passable also the communality value for each variable is greater than 0.60 interpreted as Quality Performance, Resource Conservation, Financial Performance, Innovation Performance, Cost Performance, Green Regulations/Standardization, Enhanced Productivity and Competitive Advantage, Employee Satisfaction Performance, Customer Satisfaction and New Sources of Revenue a measure of uniqueness. Hence, the study results indicated that eleven scales, such as are the most important PM to be explored to achieve excellence in green manufacturing. The proposed research instrument is expected to provide momentum for further research aimed at gaining a more comprehensive understanding of the quality related issues and implementation of TQM for achieving excellence in green manufacturing. This research instrument/questionnaire will provide impetus for further research aimed at gaining a more comprehensive understanding and better result for Indian Cement Industry.

SUMMERY

This paper provides evidence on the relation between the financial performance for effective implementation of TQM to characteristics such as firm size, the degree of capital intensity, the degree of firm diversification, the maturity of the TQM implementation, and the timing of the TQM implementation.

The key managerial implications of these results are that many organizational characteristics affect the benefits from effective TQM implementations. Although not all of these characteristics are controllable by managers, managers must set rational expectations for the degree of benefits from TQM based on their firm's characteristics. The results for size and capital-intensity validate the importance of TQM practices for smaller firms and environments that are more intensive. Investing to achieve a broader, deeper, and more mature TQM implementation (possibly by targeting an independent TQM award) should also result in higher benefits from TQM implementation. The results also indicate that it is never too late to invest in TQM. Finally, the results imply that the positive impact of TQM is widespread across a spectrum of firms with differing characteristics. There are a number of other avenues for future research. It would be interesting to study why some firms do better than others would. For example, are the quality management practices significantly different in firms that do better or is it that TQM is more useful for firms with certain characteristics? Our results suggest that research on identifying 'best' practices should at-tempt to control for firm characteristics. Future research could also examine the impact of other firm characteristics on the gains from TQM. In particular, it would be of interest to see whether variables that proxy for managerial incentives affect the gains from TQM.

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