

Effectiveness of ISO 9001 Standard Clauses and Sub Clauses in Indian Auto Component Manufacturing SMEs

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Abstract

SMEs seem to be not seriously implementing the systems and are more product and customer focussed. Low top management commitment, lack of system benefits awareness, small setup, cultural issues, competence, financial and other resources etc. might be the cause of low level of effectiveness in Indian SMEs. In overall ISO 9001 is around 70% effective but when studied clause wise it was found that many of the non product related management clauses are not effective and need a lot of attention of SMEs and the service providers. The effectiveness of the overall system increases with the increase in the effectiveness of individual requirement of the standard such as top management commitment, trainings and internal audit. The performance of the companies is associated and related with the effectiveness of the ISO 9001 standard and its clauses. The overall effectiveness increases as the clauses are implemented more effectively. Also it is observed that there are certain soft factors that can enhance and enforce effective implementation. A revised ISO 9001: 2008 standard model is proposed that integrates ISO 14001: 2004 to enhance the effectiveness. The study was done on 115 Indian autocomponent SMEs in Delhi & NCR using questionnaire instrument.

Keywords: ISO 9001, ISO 14001, Effectiveness, SMEs, Quality, Relationships, Impact factors, Clauses, Integrated Model, Management System Standards.

1. INTRODUCTION

Standards make enormous and positive contribution to most aspects of our lives. Standards ensure desirable characteristics of products and services such as quality,

environmental friendliness, safety, reliability, efficiency and interchangeability. According to Gavin P.M. Dick (2000), the standards are often criticised for fostering bureaucratic paperwork rather than quality improvement. A common criticism is the amount of money, time and paperwork required for registration. According to Seddon John (2000), ISO promotes specification, control, and procedures rather than understanding and improvement. Wade argues that ISO standard is effective as a guideline, but that promoting it as a standard "helps to mislead companies into thinking that certification means better quality, ... [undermining] the need for an organization to set its own quality standards." Paraphrased, Wade's (2002) argument is that total, blind reliance on the specifications of ISO 9001 does not guarantee a successful quality system.

The qualitative and exploratory research study was carried out on 115 ISO 9001 certified companies, in Indian auto component manufacturing SMEs in Delhi and NCR region using a detailed questionnaire. Reliability was tested using Cronebach's alpha and validated by Content, Face, Criterion and Construct methods. The study used mean, standard deviation, t-test, F-test, ANOVA, Correlation and Regression analysis tools and techniques.

1.1 SO 9001 Standard

The ISO 9000 family of standards relate to quality management systems and are designed to help organizations ensure they meet the needs of customers and other stakeholders. The standards are published by ISO, the International Organization for Standardization and available through National standards bodies.

ISO 9001:2008 is the standard that provides a set of standardized requirements for a quality management system, regardless of what the user organization does, its size, or whether it is in the private, or public sector. It is the only standard in the family against which organizations can be certified—although **certification is not a compulsory requirement** of the standard. The other standards in the family cover specific aspects such as fundamentals and vocabulary, performance improvements, documentation, training, and **financial and economic aspects**.

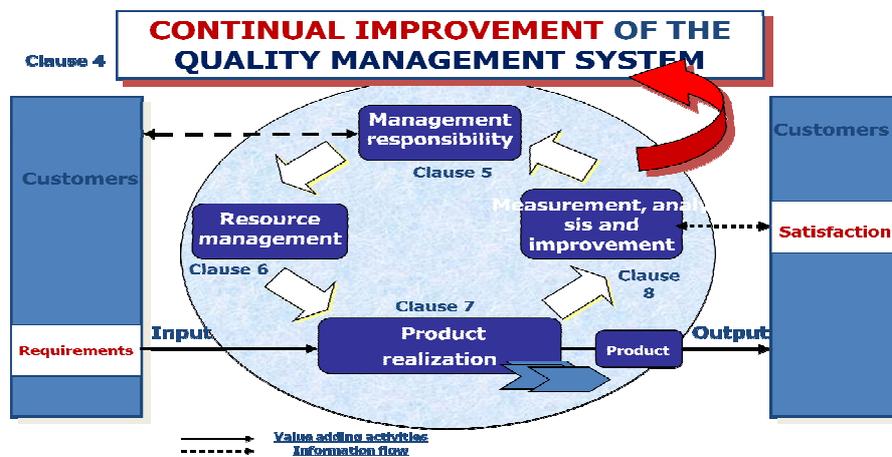


Fig. 1: ISO 9001 Process Approach Model

Source: ISO 9001: 2008 Standard

ISO 9001 Standard is based on process approach model which is supposed to give an output in the form of enhanced customer satisfaction and continual improvement of the organization. The process approach model is shown in the **Fig. No.1.6.1 and list of sub clauses is given in Annexure-II** taken from ISO 9001: 2008 standard. Customer requirements enter into the process as input and the Customer satisfaction and Continual improvement come out as an output of the process.

- **Clause 4-Quality Management System (QMS):** QMS demands that the company shall document the technical and support processes, procedures, work instructions, standards and records and control them suitably. The system shall have a quality manual that perfectly defines and documents the requirements as per ISO 9001, Customer and company requirements.
- **Clause 5-Management Responsibility (MR):** The MR clause demands that the top management of the ISO 9001 certified company shall be committed to the QMS requirements. They shall demonstrate it through documenting and establishing quality policy, customer focus, quality objectives, responsibilities, and management reviews.
- **Clause 6-Resources Management (RM):** Company shall provide adequate human resources, evaluate the competence of the people, train them, and provide necessary work environment and infrastructure to ensure effective QMS and product quality.
- **Clause 7-Product Realization (PR):** This clause is the one which directly deals with the product and its requirements. Customer requirements, product requirements, design/ development, purchasing, incoming material quality, production, service, storage, preservation and calibration are the sub requirement of this clause. The clause handles all requirements that converts raw material into finished products that is delivered to customer.
- **Clause 8-Measurement, Analysis and Improvement (MAI):** Once the product is produced and all processes have done their job then there is a need to evaluate and measure the performance. MAI requirements address internal audit, customer satisfaction, process inspection, final inspection, non-conforming product control, improvement, statistical analysis, and corrective and preventive actions. The data is analyzed to assess the performance against objectives for continual improvement and continual improvement of product quality and customer satisfaction.

1.2 Study Objectives

Objective-1: To analyze the Effectiveness of Clauses and Sub Clauses of ISO 9001 standard.

Objective-2: To identify and study relationships & factors, if any, which directly or indirectly impact effectiveness of systems in SMEs.

Objective-3: To develop and suggest a more effective model for ISO 9001 standard.

1.3 Hypotheses

H₀₁: The mean effectiveness score of ISO 9001 standard in respect of its clauses is less than 70%.

H0₂: There is no significant difference between mean effectiveness scores of ISO 9001 standard main clauses.

H0₃: There exists no correlation among ISO 9001 clauses effectiveness

1.4 Limitations of the study

The limitations of the study are as under:

- In the study, main clauses and sub clauses of ISO 9001 standard are covered.
- The study does not cover whole India and covers mainly Delhi and NCR regions for survey and data collection.
- Only Small and Medium industries in First and Second tier are considered. OEM and 3rd and 4th tier manufacturers and traders have not been covered.
- The study does not cover manufacturing sectors other than auto components. The services sector is also not part of this study.

2. LITERATURE REVIEW

Roger Frost (2007) said that ISO 9001 provides a road map, but left to itself, it will not move. The secret of ISO 9001 is...you have to do it. Contrarily David Verbloom, Operations Director, Medair, Switzerland (2007) mentioned that ISO 9001:2000 actually promotes dynamism in the drive for change and continual improvement.” According to Stephen Mathews (2005) ISO 9000 certification has made a positive impact on the marketing effectiveness of the organizations surveyed.

Evangelos L. Psomas, Angelos Pantouvakis, Dimitrios P. Kafetzopoulos (2013) confirmed the impact of ISO 9001 effectiveness is indirect through its significant correlation with operational performance. Iñaki Heras-Saizarbitoria (2011) in a research carried out in eight Spanish organizations that adopted the standard a long time ago conclude that organizations do not adopt ISO 9001 homogeneously. Bozena Poksinska, Jörgen A.E. Eklund, Jens Jörn Dahlgaard (2006) observed that ISO 9001 was implemented and operated with minimum effort and little change was experienced. QMS was not perceived as a tool for managing processes, but as a tool for handling documentation. Walid Zaramdini (2007) in a survey of 9001 certified UAE companies found that certified companies were more concerned by internal reasons like improving processes or products than by external reasons like pressure from customers or imitation of competitors. Rimantas Zajarskas¹, Juozas Ruževičius (2010) established that the real conformity of the performance processes of the enterprise researched is just 55 percent of all the requirements for indicators defined by the ISO 9001 standard. This shows that not enough attention is being paid to maintenance and improvement of quality management system in the enterprise.

Woan-Yuh Jang, Ching-I Lin (2008) demonstrated that a positive relationship exists between the extent to which companies implemented ISO 9000 and firm performance. The implementation of ISO 9000 is directly and positively impacting business performance. Durai Anand Kumar, V. Balakrishnan (2011) concluded that even though more than a million organizations have been certified to ISO QMS 9001 standard till date, there were certain common problems faced by majority of these certified organizations, which influences their business performance and that there is a

scope for developing a strategic framework to reach business excellence through developing a strategic management system.

Indian SMEs were found to be not proactive in initiating QMS and EMS led improvements in their own organizations and their supply chains even though they had adequate awareness.

The certification to QMS and EMS has resulted in more internal improvements rather than external benefits. ISO 9001 certification appeared to improve the performance of SMEs and companies are benefited from ISO 9001 certification. But the critics did not find ISO 9001 and ISO 14001 standards effective tools for improvement and blame that they enhance paper work and are not reliable way of achieving assured quality products. They don't find a proven link between certification and improved business performance.

The product / service quality and operational performance of the service companies are directly and significantly influenced by ISO 9001 effectiveness but the problem is that the organizations do not adopt ISO 9001 homogeneously. ISO 9001 is a road map and gives a platform for improvement but left to itself, it will not give the desired outcome. It actually promotes dynamism in the drive for change and continual improvement.

3. ANALYSIS AND INTERPRETATION

3.1 Impact of Demographic Factors

Figures from Fig. No.2 to 6 show the analysis of impact of demographic factors—Classification of SMEs, Tier Level, Certification purpose, Turnover and Employee strength. The analysis showed that:

- The companies tend to implement the systems more effectively as the level of investment in plant and machinery goes up. The Small scale industry is reasonably effective (69%) and Medium scale is Very effective (79%) in implementing ISO 9001 Standard requirements (**Fig. No.2**).
- The graph in Fig. No.3 clearly shows that Tier-1 supplier's systems are better than that of Tier-2 for ISO 9001 Standard. This may indicate that suppliers in direct touch with OEMs are better implementing ISO 9001 Standard than those who are one level far from OEMs.
- The graph (Fig. No.4) indicates that the effectiveness of systems is highest (Very high) in companies who opted to go for certification for internal improvement purpose (79%). Same is true for SMEs who wanted certification to grow their business (75%). Although companies are taking certifications under customer pressure or to fight competition are touching the cut off level (70%) but their effectiveness is low comparatively (69% & 70%).
- Very evident from graph (Fig. No.5) that the financial condition of the companies has affected systems performance in SMEs. The effectiveness is highest (88%) for turnover more than 100 crore and lowest (65%) for turnover less than 1 crore. It can be said that the business growth tends to increase SMEs investment on systems implementation and put more resources to support it.

- The trend in the above graph (Fig. No.6) justifies the statement given above that an increase in resources help in improving the systems in ISO 9001 certified SMEs. There is an increasing trend of effectiveness (67% to 79%) as the number of employees in a company increase. More working hands may mean more effective systems. The effectiveness for 26 to 100 and 101 to 250 employee categories remains almost constant.

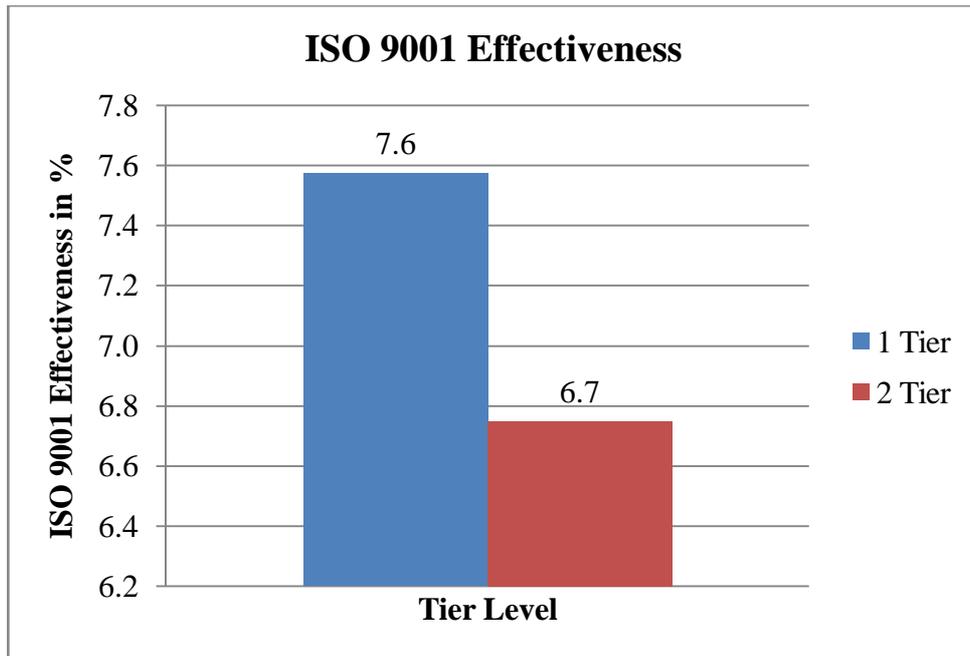


Fig. 2: Impact of SMEs classification.

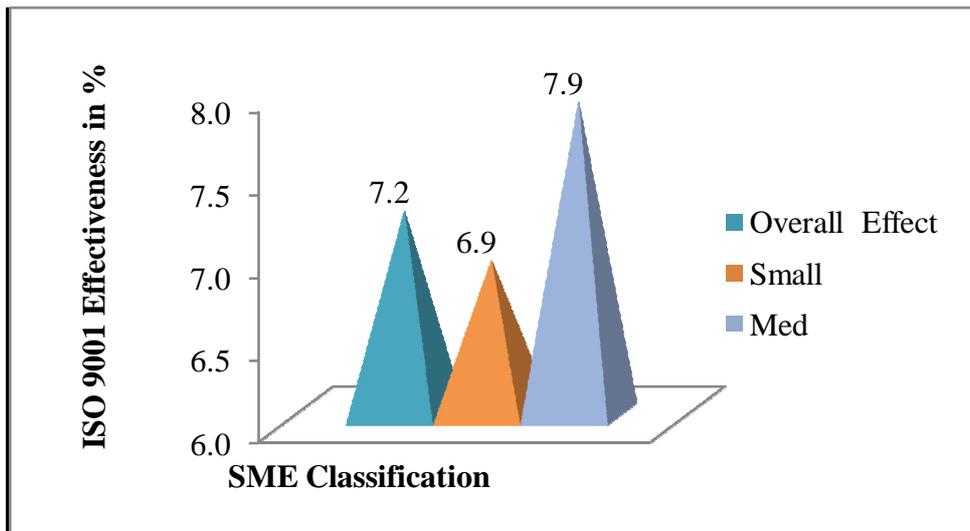


Fig. 3: Impact of SMEs Tier Level

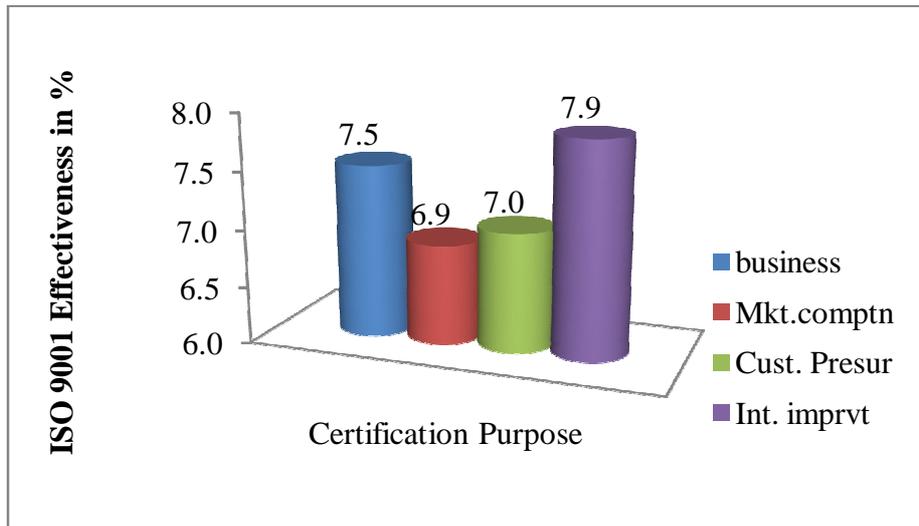


Fig. 4: Impact of Certification Purpose.

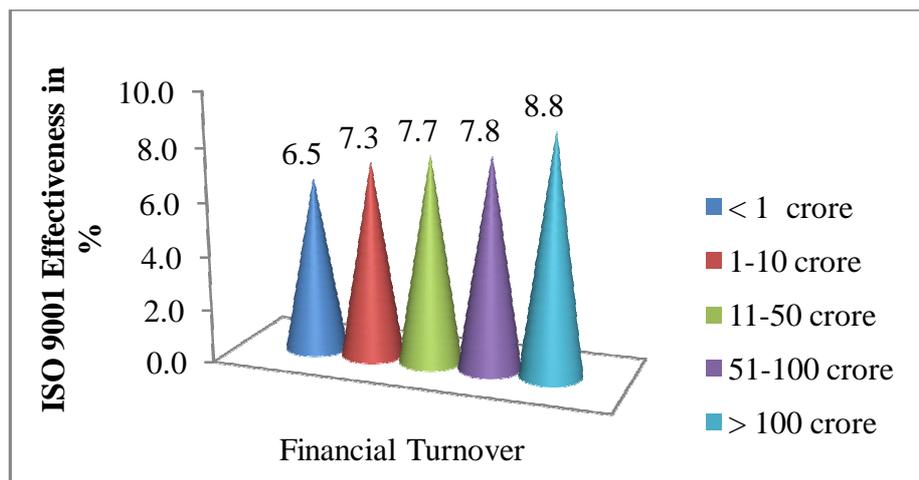


Fig. 5: Impact of Turnover.

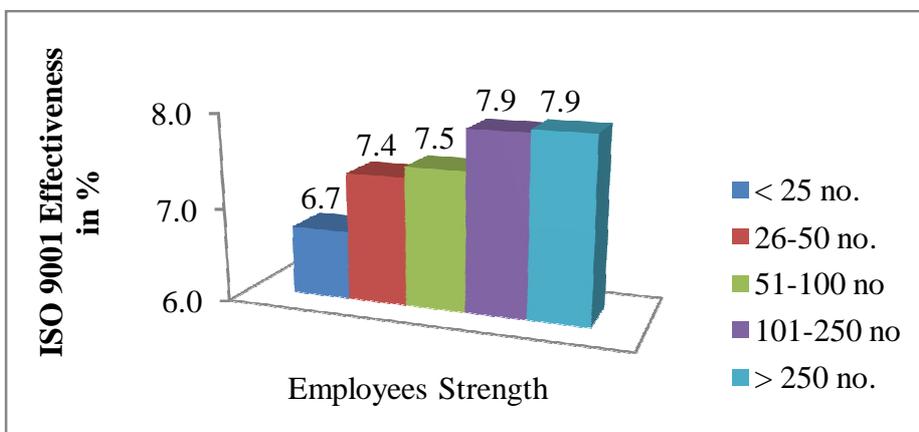


Fig. 3: Impact of SMEs Tier Level

3.2 Effectiveness of Main Clauses of ISO 9001 Standard

The graph (Fig. No.7) shows the percentage effectiveness of five main clauses of the standard rated on 0-10 percent scale. A minimum expected rating in the clauses is 70 %. The effectiveness of Clause 4 and 5 is less than 70% and that of clause 6 and 8 is at border line. The effectiveness of clause 7 is 77% which is highest in all clauses indicating that companies implement systems more effectively for clauses which are more product and production oriented.

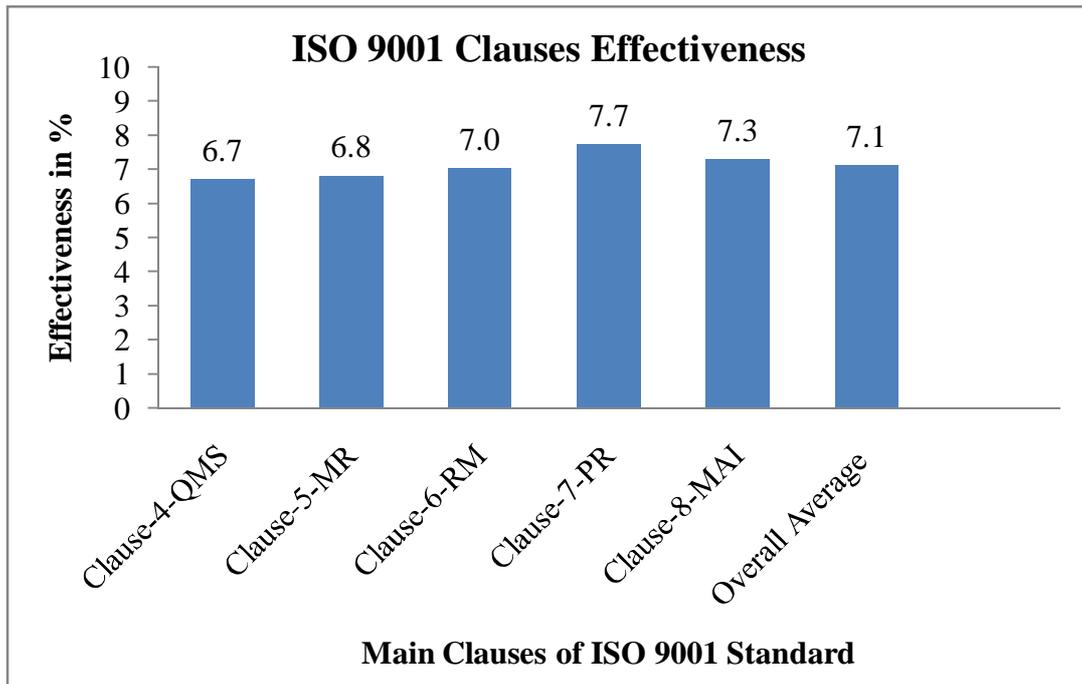


Fig. 7: ISO 9001 Main Clauses Effectiveness.

3.3 ISO 9001 Main Clauses t-test Analysis

Since the p-value (Table No.1) is higher than significance level of 0.05 for QMS, MR and RM clauses the null hypothesis H_{01} can not be rejected for them. The Null hypothesis that the effectiveness of ISO 9001 is less than 70% is rejected for PR, MAI and overall effectiveness.

Table 1: ISO 9001 Main Clauses t-test Statistics.

| Clauses | Mean | Std Dev | t-Value | p-value (t-test) | H_{01} : Mean Eff < 7 |
|------------------------|------|---------|---------|------------------|-------------------------|
| QMS | 6.7 | 2.1 | -1.31 | 0.904 | Fail to reject H_{01} |
| MR | 6.8 | 1.9 | -1.11 | 0.864 | Fail to reject H_{01} |
| RM | 7.0 | 1.9 | 0.14 | 0.445 | Fail to reject H_{01} |
| PR | 7.7 | 1.3 | 6.00 | 0.000 | Reject H_{01} |
| MAI | 7.3 | 1.6 | 1.96 | 0.026 | Reject H_{01} |
| ISO 9001 Effectiveness | 7.2 | 1.5 | 1.68 | 0.047 | Reject H_{01} |

3.4 ANOVA of ISO 9001 Main Clauses

The table No.2 shows ANOVA for comparing means of main clauses of ISO 9001: 2008 standard to test whether the mean effectiveness of all these clauses is significantly same or different at 5% significance level. The result show that p-value (0.0001) is less than significance level so null hypothesis that there is no significant difference in the mean values of the five main clauses of ISO 9001 standard is rejected.

The Table No.2 shows a comparison of means and standard deviations of main 5 clauses of ISO 9001: 2008 standard. The range of the mean is 0.97 and range of standard deviation is 0.76. The QMS has the lowest mean (6.74) and highest standard deviation (2.05) whereas the PR has highest mean score (7.72) and lowest standard deviation (1.29). The mean values of QMS and MR clauses are less than 70%.

Table 2: ISO 9001 Main Clauses Statistics (ANOVA)

| Clauses | All Clauses | QMS | MR | RM | PR | MAI |
|------------------------|-------------------------|------------|-----------|-----------|-----------|------------|
| Samples | 575 | 115 | 115 | 115 | 115 | 115 |
| Mean | 7.12 | 6.75 | 6.80 | 7.02 | 7.72 | 7.28 |
| St Dev | 1.79 | 2.05 | 1.93 | 1.87 | 1.29 | 1.56 |
| F-value | 5.92325 | | | | | |
| P-value (ANOVA) | 0.00011 | | | | | |
| Null H ₀ 2: | Reject H ₀ 2 | | | | | |

3.5 ISO 9001 Main Clauses Correlation Analysis with Overall Average Effectiveness

All clauses are positively and strongly correlated with average effectiveness. A simple linear regression (Table No.3) was performed to determine if there was a significant relationship between Main clauses and ISO 9001 average Effectiveness. 77% to 94% of the variability in ISO 9001 average effectiveness could be explained by the degree of implementation of main clauses of the standard. The Null hypothesis H₀3 that there is no correlation of clause of the standard with average effectiveness of ISO 9001 system is rejected for all main clauses as shown in Table No.3.

Table 3: ISO 9001 Correlation & Regression.

| Clauses | R-Coeff of Correlation | R Square-Coeff of determination | Type & Strength of relationship | H₀3 : R=0 |
|----------------|-------------------------------|--|--|-----------------------------|
| QMS | 0.88 | 0.77 | Positive & Strong | Reject H ₀ 3 |
| MR | 0.92 | 0.86 | Positive & Strong | Reject H ₀ 3 |
| RM | 0.91 | 0.83 | Positive & Strong | Reject H ₀ 3 |
| PR | 0.91 | 0.83 | Positive & Strong | Reject H ₀ 3 |
| MAI | 0.97 | 0.94 | Positive & Strong | Reject H ₀ 3 |

The Table No.4 below show the inter correlation of the clauses of ISO 9001 standard with each other. The correlation matrix shows that there is sufficiently strong

and positive correlation among the clauses of the standard. This means that effectiveness with which one clause is implemented causes a positive impact on other clauses, the degree of which varies from medium to high.

Table 4: Correlation among clauses and with overall average effectiveness.

| QMS | 1.00 | | | | | |
|----------------------|-------------|------|------|------|------|------|
| MR | 0.86 | 1.00 | | | | |
| RM | 0.79 | 0.79 | 1.00 | | | |
| PR | 0.69 | 0.74 | 0.81 | 1.00 | | |
| MAI | 0.83 | 0.85 | 0.87 | 0.88 | 1.00 | |
| Av QMS Effectiveness | 0.88 | 0.92 | 0.91 | 0.91 | 0.97 | 1.00 |

3.6 Effectiveness of Sub-Clauses of ISO 9001 Standard

The main clauses of ISO 9001: 2008 standard have many requirements in the form of sub-clauses under each main clause. Fig. No.8 shows the effectiveness analysis of Sub-clauses of ISO 9001 standard. The 64% of ISO 9001 requirements were effectively implemented and effectiveness of 34% requirements was not up to the mark. Precisely and namely Process approach, Quality policy, Objectives, QMS planning, MRM, R&A, Training & competence, Internal audit and Data analysis clauses were not effectively implemented with less than 70% score. Customer and product oriented clauses like Customer focus, Customer related processes, Design, Control of production, Calibration, Customer satisfaction, Monitoring of product and CAPA for customer complaints were effectively implemented with more than 70% score. In ISO 9001 none of the clause was completely 'Not effective' (0-20 %) or 'Little effective' (21-40 %) in SMEs.

A simple linear regression was performed to determine if there was a significant relationship between sub-clauses and average effectiveness. Furthermore, 34% to 80% of the variability in average effectiveness could be explained by the degree of implementation of sub-clauses. Correlation analysis results show that all sub clauses are positively correlated with average effectiveness of ISO 9001, proving that the effectiveness of systems increases with the degree of implementation of sub clauses. The strongly positively correlated clauses were TM Commitment, Policy & Objectives, MR, MRM, Training Competence, Cont. improvement & CAPA Rejection. Moderately positively clauses are Processes, Documentation, Customer focus, QMS Planning, R& A, Internal Communication, Work environment, PR Planning, IQC, Housekeeping, Identification storage, Calibration, MAI Planning, Internal audit, PQC, NC Product, and CAPA complaints. Weakly correlated clauses are Resources, Infrastructure, Customer related process, Design Development, Purchasing, Production control, Maintenance, Customer Satisfaction, FQC and Data Analysis.

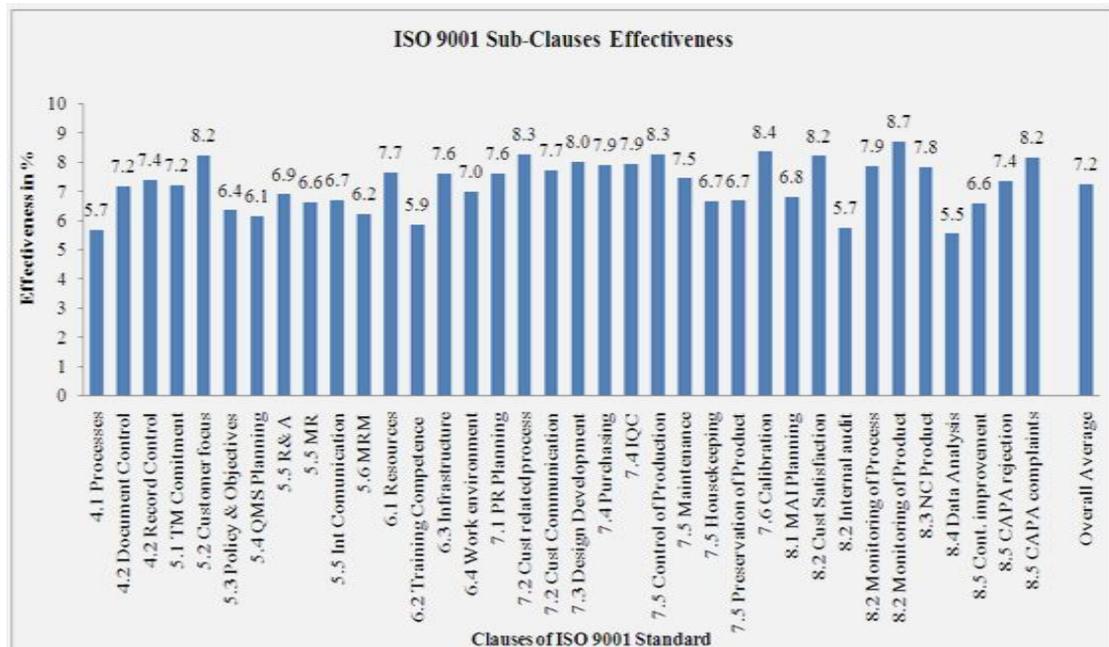


Fig. 8: ISO 9001 Sub Clauses Effectiveness The parametric study of sub clauses of ISO 9001 standard indicated mix results. The mean effectiveness ranges from 5.55 to 8.7. This shows that at least 55% effectiveness is there in SMEs and there are SMEs groups who can attain around 87% effectiveness. Variance observed from 1.32 to 2.89 standard deviations from the mean. Out of 36 requirements Null Hypothesis was not true in 13 cases in ISO 9001.

4. FACTORS IMPACTING SYSTEM EFFECTIVENESS

From Survey, Literature review and Analysis a number of factors and variables came into light that in one way or the other, less or more impact and affect SMEs Performance, Systems, Quality, Customer Satisfaction and Improvements. These factors are summarized below (Table No.5).

Table 5: Identification and Categorization of Factors.

| S. N | Factors Impacting Systems Effectiveness |
|------|--|
| 1 | Top Management Top management philosophy, Management Review, Top management commitment, Strategic Planning, Organizational resources, Certification Purpose, Consultancy and Training Budget, Certification Budget --(8 factors) |
| 2 | Customer Increased interaction with customers, Customer involvement, Customer focus --(3 factors). |
| 3 | Quality Quality measurement, Continuous improvement, quality tools and techniques implementation, Quality-oriented culture, Quality audit, Quality Focus --(6 factors). |

| | |
|---|--|
| 4 | Human Aspects Efficiency improvement, Employee training, Leadership, involvement of everyone, Communication, Teamwork, Employee empowerment, Rewards systems, Education and self improvement, Workforce Focus, Employee Motivation–(11 factors). |
| 5 | Consultant Competence, Selection criteria of consultant, Involvement with Consultant–(3 factors). |
| 6 | Certification Body Selection criteria of Certification Body, Development-oriented auditors, Competent auditors–(3 factors). |
| 7 | Systems Process-cantered approach, Customizing the standard’s requirements, Information management, System approach to management, Factual approach to decision making, IMS, Plan-Do-Check-Act, Tools & Techniques, Supplier support–(9 factors). |
| 8 | Demographic Company size, Tier level Distance from OEMs, Financial status/ turnover, Employees strength, Cost --(5 factors). |
| 9 | Negative Factors Poor understanding of “ process approach, Inadequate technical knowledge, Commercial considerations, Conflicts of interest (not only consulting !), – Ethical considerations, Too little focus on QMS performance, Too much focus on documents, Too little focus on results, Little focus on Management related Clauses, Too much focus on Customer, Too many standards difficult to handle, Language of the standard, Viewing Consultant as a Vendor and not as a mentor, Lack of Patriotism, No awareness or Negligence Towards Consequences of Poor Quality and Systems on Human Factor, Government Ignorance or Unawareness to Treat Quality and Systems as Crucial as Human life and Means and Ways to Save Natural and Artificial Resources–(33 factors). |

5. PROPOSED SYSTEMS MANAGEMENT STANDARD (SMS) MODEL

ISO 9001: 2008 and ISO 14001: 2004 Standards address the requirements for Quality and Environment Management systems. In standards there are tables at the end that show correspondence and relation between the clauses. There are very few clauses only that are entirely different and do not correspond with both the standards. Here researcher has modified the ISO 9001: 2008 standard’s clause headings only and has merged the requirements of ISO 14001: 2004 standard and some other requirements that researcher found worth including within the scope of this study. The description of the clauses of the standard is out of the scope of the research and therefore has not been covered here.

The Clauses of the Systems Management Standard (SMS) integrating ISO 9001: 2008 & ISO 14001: 2004 standards are given in Table No. 6. The ISO 9001: 2008 standard and its clauses have been used as base for the proposed SMS standard.

Table 6: Proposed Systems Management Standard (SMS)

| Proposed SMS Standard Model | |
|------------------------------------|---|
| 0.1 | Scope of the standard |
| 0.2 | Normative references |
| 0.3 | Terms and definitions |
| 0.4 | Approach and Methodology |
| 1.0 | Control Mechanism |
| 1.1 | Updated list of all customers & products in a pre specified format |
| 1.2 | Updated profile of company in a pre specified format |
| 1.3 | Updated performance indicators and their status in a pre specified format |
| 1.4 | Internal, CB & Customer audit status in specified format |
| 1.5 | Scope of certification-sites, customers, products, functions, processes, |
| 1.6 | Exclusions |
| 1.7 | Systems effectiveness evaluation and score |
| 2.0 | Documentation and Implementation Management and Control |
| 2.1 | Mandatory documents & records |
| 2.2 | Processes documentation in a pre specific format-scope, output, input, resources, procedures, responsibilities, documents, performance indicators, objectives, targets, timeline. |
| 2.3 | Master list of all documents |
| 2.4 | Master list of all records |
| 2.5 | Procedure for control of documents & records |
| 2.6 | Internal Audit and value additions in systems |
| 2.7 | Systems issues & improvement planning |
| 2.8 | Analysis and action on Processes data |
| 2.9 | Continual improvement projects and results |
| 2.10 | Legal requirements |
| 3.0 | Management responsibility |
| 3.1 | Company Policy |
| 3.2 | Company Objectives and action planning |
| 3.3 | Appointment of Competent & power MR |
| 3.4 | Management review -MIS, Process Performance Indicators, Financial, Major issues, Employees, and Resources provision based management review |
| 3.5 | Infrastructure & facilities |
| 3.6 | Work environment |
| 3.7 | Business growth and profitability projects |
| 4.0 | Customer Focus |
| 4.1 | Customer's Products & Processes related (Technical) requirements |
| 4.2 | Customer's systems related and other requirements |
| 4.3 | Customer complaints, issues and feedback |
| 4.4 | Customer satisfaction |
| 4.5 | Customer representative |
| 4.6 | Customer communication |

| |
|---|
| <p>5.0 Human Resources Focus</p> <p>5.1 Competence</p> <p>5.2 Knowledge, Awareness, Education, and Training</p> <p>5.3 Employees participation and involvement</p> <p>5.4 Employees motivation</p> <p>5.5 Administration & Control</p> <p>5.6 Employees performance & effectiveness</p> <p>5.7 Internal communication</p> |
| <p>6.0 Design and development</p> <p>6.1 Product design</p> <p>6.2 Process design</p> <p>6.3 Tool design</p> <p>6.4 Design control</p> |
| <p>7.0 Purchasing</p> <p>7.1 Material Standards</p> <p>7.2 Supplier Selection, Evaluation and Development</p> <p>7.3 Purchase Planning and Monitoring</p> <p>7.4 Purchased material quality assurance</p> |
| <p>8.0 Production and Supporting Processes Management</p> <p>8.1 Technical standards and specifications for product or its stages</p> <p>8.2 Technical standards and specifications for technical processes or its stages</p> <p>8.3 Tooling management</p> <p>8.4 Machines management</p> <p>8.5 Measuring instruments & gauges management</p> <p>8.6 Product preservation</p> <p>8.7 Housekeeping management</p> <p>8.8 Production planning & scheduling</p> <p>8.9 Processed material and product Quality assurance and Quality control</p> <p>8.10 Internal and External NC products and rejection management</p> <p>8.11 Corrective and preventive actions for internal and external quality problems and issues</p> <p>8.12 Emergency and contingency preparedness</p> |
| <p>9.0 Environmental Safety and Hazard Management</p> <p>9.1 Aspect Impact Identification and evaluation</p> <p>9.2 Environmental management programmes</p> <p>9.3 Environmental specifications</p> <p>9.4 Operational controls, monitoring & and measurements</p> <p>9.5 Applicable Legal laws</p> <p>9.6 Evaluation of environmental compliances including legal and operational requirements</p> |

6. CONCLUSION

Following conclusions can be made from the overall work conducted in this research about the effectiveness of ISO 9001 Standard in Indian auto component

manufacturing SMEs:

- The overall effectiveness of ISO 9001 standard is just O.K. i.e. 72%.
- The effectiveness of many sub clauses is very less as compared to the overall effectiveness and the criteria score of 70%.
- The companies whose overall ISO 9001 effectiveness is higher they perform better in sub clauses and the companies whose overall effectiveness is lower they perform poorer in sub clauses. The same thing can be said other way round also.
- The demographic factors like turnover, employee strength, company size, tier level, certification purpose etc. play a crucial role in deciding the effectiveness in SMEs.
- Clauses like top management commitment, training and internal audit are positively and strongly related to the effectiveness.
- All sub clauses have some kind of (weak, moderate or strong) positive correlation with the overall effectiveness of the standards.
- The product and manufacturing process related sub clauses have high effectiveness while management and supporting processes have low level of effectiveness.
- A model that includes soft side of the requirements and a paradigm shift to knowledge base and company and customer oriented approach (proposed model) can improve effectiveness.
- Factors like customer pressure, motivation, employee involvement, top management involvement, easy documentation, result based implementation, business improvement oriented approach can develop interest of top management, employees, consultants and certification body towards effective implementation.

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