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To study quality Management System and Effects of ISO9001:2015 standard on performance of automotive companies in Chakan Industrial Area

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Abstract:

The present paper deals with various aspects of quality Management system and study of impact of ISO9001:2015 standard on medium size automotive companies in Pune in Chakan area. The writer intends to discuss about effect of implementation of quality management system standard, on performance of companies through various parameters.

Writer also wants to describe quality issues in companies and has given suggestions for improvement in quality.

Keywords: *quality Management system, ISO9001:2015, automotive companies*

0.1 Introduction:

“Quality” and “quality management systems” have been leading in the business world for last two decades. Different consultants have built their careers around these topics, and quality issues in business have been responsible for the development of new organizations and even industries.

The presence of quality in business focuses on the savings and additional revenue that organizations can realize if they eliminate errors throughout their operations and produce products and services at the optimal level of quality desired by their customers. Errors can take any form. It is very common, and the costs incurred seem minimal. But over time when mistakes are repeated the costs add up to a significant amount, so eliminating errors can result in significant increases to the bottom line of a business.

Quality Management is a part of the overall management. Quality Management

organizes controls and directs resources for achieving objectives for quality. It is essentially concerned with defining the quality policy. Quality Management is inseparable from overall management functions. It is “Coordinated activities to direct and control organizations with regard to quality”.

ISO 9001 is the international standard for creating a Quality Management Systems (QMS), published by ISO (the International Organization for Standardization). The standard was most recently updated in 2015, and it is referred to as ISO 9001:2015. In order to be released and updated, ISO 9001 had to be agreed upon by a majority of member countries so that it would become an internationally recognized standard, which means it is accepted by a majority of countries worldwide.

0.1.1 Objectives:

- 1) To evaluate historical approach of quality management system in automotive industry
- 2) To take overview of quality standards with reference to ISO9001:2015 for quality Assurance.
- 3) To observe improvement in customer satisfaction level after implementation of ISO9001:2015 Standard on auto components.
- 4) To evaluate importance of quality standards in automotive products in today's fast competitive world.

0.1.2 Hypothesis:

1 Null Hypothesis: There is no effect of ISO 9001 standard on performance of companies in Pune Area.

Alternative Hypothesis: There is improvement in performance of companies after ISO 0.1 9001 implementation.

0.2 HISTORY OF QUALITY MANAGEMENT SYSTEM:

The idea of quality is not a recent invention and has been around for thousands of years. It is probably as old as trade, which started as soon as man became capable of producing surplus goods that could be offered in exchange for other desirable products. Quality outlook focused initially on product conformance more than on anything else. The "Terracotta Army", a large number of clay figures of foot and horseback soldiers, which were buried with the ancient Chinese Emperors. It is not that commonly known, however, that individual figures were made by different craftsmen, and that each of them bore a chop mark of the maker. This allowed the identification and punishment of the craftsmen who failed to meet the emperor's requirements. The punishment, which was severe, served as a lesson that it is better to yet things right first time, every time.

Since the Middle Ages implementing quality in products was the aim of skilled craftsmen. They were gaining a reputation for quality products through skilled craftsmanship, which was maintained over

years through enforcing a lengthy and rigorous apprenticeship of those who wanted to become masters of the trade. Craftsmen organized themselves in monopolistic guilds to ensure a high level of product quality, by achieving a high level of skills throughout the trade and membership.

In 1931 W. A. Shewhart of Bell Laboratories published his "Economic Control of Quality of Manufactured Product". This set precise definitions of manufacturing quality control and gave the Taylor's theory a much stronger footing.

In the period of Industrial revolution, there was need for new management, new organization structure, workers, supervisors, foremen and managers, Scientific management introduced by Taylor's thinking promoted mechanistic operation to increase output through mass production (known also as chain production), where jobs were broken down into individual parts produced by specialized workers. Since the early nineteen forties a rapid development was seen, and famous quality scientists emerged with their theories, to mention names such as Deming, Juran, Crosby, Shingo, Taguchi, and Ishikawa.

The Japanese were the first to switch their commercial interest from competition in productivity and price to competitive quality. Their quality revolution enabled them to win the quality challenge and led to explosive expansion of their exports.

The ultimate success and the present reputation of Japanese products set the benchmark for western industries, which had to adopt suitable quality management methods.

0.3 Meaning of Quality:

The term 'Quality' was used over the years to describe such attributes as beauty, goodness, expensiveness, freshness and above all luxury Quality means "Degree to which a set of inherent characteristics fulfills requirements",

Quality is now often defined as total conformance to the requirements; these requirements are total customer requirement and organization requirements, not just conformance to product specification. This far-reaching application of quality to every activity has taken many years to develop and is a long way from where it begun.

Grade Means "Category or rank given to different quality requirements for products, processes or systems having the same functional use"

0.4 Quality Assurance:

"Part of quality management focused on providing confidence that quality requirements will be fulfilled"

The internal aspect is as follows: quality assurance within an organization gives confidence to the management. It is the confidence that we are understanding the requirements of our customers at all times and that we have the established capability to meet these requirements at the lowest possible cost, thus continuously making a profit.

External aspect: quality assurance within an organization provides confidence to the

customer. The definition of quality assurance describes that the key issue is to define what our products are and to determine what the requirements for quality are.

0.5 Quality Control:

"Part of quality management focused on fulfilling quality requirements" It involves operational techniques and activities that are aimed both at monitoring processes and eliminating the causes of unsatisfactory performance at all the stages of a quality loop in order to achieve economic effectiveness. Quality control is of a reactive nature. Techniques such as inspections, monitoring of product characteristics, process monitoring etc. are being used to assess the performance, often using statistical techniques. Should it fall below requirements, corrective actions are implemented to eliminate the causes.

0.6 Quality Management:

"Coordinated activities to direct and control an organization with regard to quality" This definition clearly indicates that the quality management is inseparable from the overall management function. It does not need to be emphasized therefore that the quality system has to be woven into the fabric of the overall management system.

When anyone thinks about management, has to think about leadership. Effective leadership is not an easy task, and requires extensive knowledge of the theory of management, psychology, sociology, anthropology etc.

0.7 Definitions and Requirements of Quality Management System:

Management system is "System to establish policy and objectives and to achieve those objectives" and Quality Management System is "Management system to direct and control an organization with regard to quality"

A quality management system is a management technique used to communicate to employees what is required to produce the desired quality of products and services and to influence employee actions to complete tasks according to the quality specifications.

Requirement Of Quality Management System-

- 1 Establishes a vision for the employees.
- 2 Sets standard systems and procedures for employees.
- 3 Builds motivation within the company.
- 4 Sets Targets for employees.
- 5 Helps fight the resistance to change within organizations.
- 6 Helps direct the corporate culture.

0.8 Importance of Quality:

Business success may simply be the extent to which your organization can produce a higher-quality product or service than your competitors are able to do at a competitive price. When quality

is the key to a company's success, quality management systems allow organizations to keep up with and meet current quality levels, meet the consumer's

1.0 Examples of Quality Management System Standards:

1.1 ISO 9001: It is basic standard of Quality Management System. The purpose of standards development of fundamental quality system in organizations which are accepted globally

1.2 IATF 16949 the International organization for standardization released a technical specification that specifies the requirement for application of ISO 9001. The goal of this Technical specification is the development of fundamental quality system that provides for continual improvement emphasizing defect prevention and reduction of variation and waste in the supply chain."

1.3 TL: Standard developed by the Quality excellence for suppliers of Telecommunications leadership forum (Quest forum) It was specifically designed for the telecommunications industry to documents the industries quality systems requirements and metrics.

1.4 AS: Is the basic quality system standard for aerospace industry published by society of automotive engineers in May 1997 this document is based on input from a group of the major supplies. (Being Lockheed martin northrop Grumman, GE aircraft engine and others) as 9000 is composed of the international ISO 9001 standard with B6 clarifications specifically applicable to aerospace industry.

1.5 ISO 14001:2015: It is designed for environmental management system. Environmental safety is the focus of this standard and systems are established for safety of environment

1.6 ISO 45001: Occupational health and safety: This standard is established for protecting people from occupational hazards, Safety of working people in work place is the intention of establishing this Standard.

2.0 ISO 9001 Standard:

An ISO 9001 definition would be that this standard provides the QMS requirements to be implemented for a company that wants to create all of the policies, processes, and procedures necessary to provide products and services that meet customer and regulatory needs and improve customer satisfaction. Quality management systems are the foundation of quality assurance activities.

2.1 Importance of ISO 9001 Standard:

As stated above, ISO 9001:2015 is an internationally recognized standard for creating, implementing, and maintaining a Quality Management System for a company. It is intended to be used by organizations of any size or industry, and it can be used by any company. As an international standard, it is recognized as the basis for any company to create a system to ensure customer satisfaction and improvement and, as such, many corporations require this certification from their

suppliers.

ISO 9001 certification provides your customers reassurance that you have established a Quality Management System based on the seven quality management principles of ISO 9001. To learn more about the quality management principles behind the ISO 9001 standard, take a look at this article: Seven Quality Management Principles behind ISO 9001 requirements.

In fact, ISO 9001 is such an essential and influential standard that it is used as the basis when industry groups want to create their own industry standards; this includes AS9100 for the aerospace industry, ISO 13485 for the medical devices industry, and IATF 16949 for the automotive industry. A survey of ISO 9001 certification at the end of 2017 shows that, in spite of the global recession, the number of companies that have implemented the ISO 9001 quality management standard still remains stable worldwide. Below are the results over the previous six-year period.

2.2 ISO 9001:2008:

ISO 9001:2008 is the revision of the ISO 9001 standard that was withdrawn in 2015. ISO 9001:2008 was based on its predecessor, ISO 9001:2000, with some minor additions. ISO 9001:2000 was the first revision of the ISO 9001 standard to be based on the seven quality management principles identified above that made the standard requirements about everything a company does to create products and services. Revisions of ISO 9001 before the ISO 9001:2000 revision (ISO 9001:1987 & ISO 9001 1994) were based more on writing and following 20 specific procedures, rather than understanding the processes of the organization.

2.3 ISO 9000 and ISO 9001:

While ISO 9001:2015 is the current ISO standard for creating a Quality Management System, there are other documents in the ISO 9000 family that support the ISO 9001 requirements. ISO 9000 explains the seven quality management principles behind ISO 9001, and defines all of the terms used within the ISO 9001 standard. Additionally, ISO 9004 provides guidance on making an ISO 9001 Quality Management System more successful and focuses on how to improve the implemented ISO 9001 processes by giving some best practice information.

2.4 Purpose of ISO 9001:

The International Organization for Standardization (referred to as ISO, as this is the Greek word for “the same”) is an international organization that creates standard sets of requirements and guidelines to help organizations around the world to act in a more consistent manner. The ISO organization develops, publishes, and maintains more than 22,450 standards through technical committees that include members from all over the world. These standards provide information on how to design and build products, perform specific testing, and create management systems.

It is important to note that the ISO does not provide certification or conformity auditing or assessment. The ISO is strictly involved in the maintenance of the standards, and it leaves the

assessment of companies against the standards to external certification bodies.

2.5 ISO 9001 Requirements:

The structure of the ISO 9001:2015 standard is split into 10 sections (clauses). The first three are introductory, while the last seven contain the requirements for the Quality Management System against which a company can be certified. Here is what the seven main clauses are about:

Clause 4: Context of the organization – This section talks about requirements for understanding your organization in order to implement a QMS. It includes the requirements for identifying internal and external issues, identifying interested parties and their expectations, defining the scope of the QMS, and identifying your processes and how they interact. Expectations of interested parties include regulatory requirements as well.

Clause 5: Leadership – The leadership requirements cover the need for top management to be instrumental in the implementation of the QMS. Top management needs to demonstrate commitment to the QMS by ensuring customer focus, defining and communicating the quality policy, and assigning roles and responsibilities throughout the organization.

Clause 6: Planning – Top management must also plan for the ongoing function of the QMS. Risks and opportunities of the QMS in the organization need to be assessed, and quality objectives for improvement need to be identified and plans made to accomplish these objectives.

Clause 7: Support – The support section deals with the management of all resources for the QMS, covering the necessity to control all resources, including human resources, buildings and infrastructure, the working environment, monitoring and measurement resources, and organizational knowledge. The section also includes requirements around competence, awareness, communication, and controlling documented information (the documents and records required for your processes).

Clause 8: Operation – The operation requirements deal with all aspects of the planning and creation of the product or service. This section includes requirements on planning, product requirements review, and design, controlling external providers, creating and releasing the product or service, and controlling nonconforming process outputs.

Clause 9: Performance evaluation – This section includes the requirements needed to make sure that you can monitor whether your QMS is functioning well. It includes monitoring and measuring your processes, assessing customer satisfaction, internal audits, and ongoing management review of the QMS.

Clause 10: Improvement – This last section includes the requirements needed to make your QMS better over time. This includes the need to assess process nonconformity and taking corrective actions for processes.

These sections are based on the Plan-Do-Check-Act cycle, which uses these elements to implement change within the processes of the organization in order to drive and maintain

improvements within the processes.

3.0 DATA ANALYSIS:

Data from ISO9001:2015, Out of 100 ISO9001:2015 companies in Chakan area 10 minimum size companies were collected, The companies certified with ISO 9001 and parameters selected for collecting data was collected

Data from ISO9001:2015, 10 minimum size companies were collected

3.1 Calculation of Average Performance of companies:

For knowing impact of ISO9001 on companies study was made about performance of companies.

Before certification and after certification through various parameters like Absenteeism, Break down time, Cost of poor quality, Cost of spares, Cost reduction, Expenditure on sales, Internal rejection, External rejection, Lead time for development, rejection in sales ratio, Grievance in companies.

In all above parameters it was observed that there is reduction in above parameters in all companies after certification absenteeism, Break down time etc.

Where as improvement in parameters after certification like Productivity, Work in progress, Inventory Turnover Ratio, Share of business, Customer Satisfaction Level, Quality Improvement, Machine Utilization, Communication, Attitude towards work, Product Improvement, and work satisfaction.

3.1 Parameters showing Average Reduction in parameters after implementation of ISO9001 - Chi square Test,

Chi square test = $\sum [(\text{Observed} - \text{Expected})^2 / \text{Expected}]$

Expected : Average values of 10 companies before certification

Observed : Average values of 10 companies after certification

For testing null hypothesis, it is assumed that there is no change in performance of companies before and after ISO certification. Rating before ISO is considered expected, and after ISO is considered observed.

		Values			
Sr No	Row Labels	Sum of before Expected	Sum of After observed	o-E	o-E ² /E
1	Absenteeism	30	15	15	7.5
2	Break down time	80	29	51	32.51
3	Cost of Poor Quality	68	38	30	13.23
4	Cost of spares	70	45	25	8.92

5	Cost Reduction	75	25	50	67.33
6	Expenditure on sales	70	28	42	25.2
7	External Rejection	75	25	50	33.33
8	Grievance	70	24	46	30.22
9	Internal Rejection	78	25	53	36.00
10	Lead time for Development	75	35	40	21.00
11	Rejection to sales ratio	60	20	40	26.00
12	Waste Reduction	75	27	50	33.33
	Grand Total	826	336	490	290.67

Calculated value is 290.67.

Degree of freedom = $n-1(12-1) = 11$

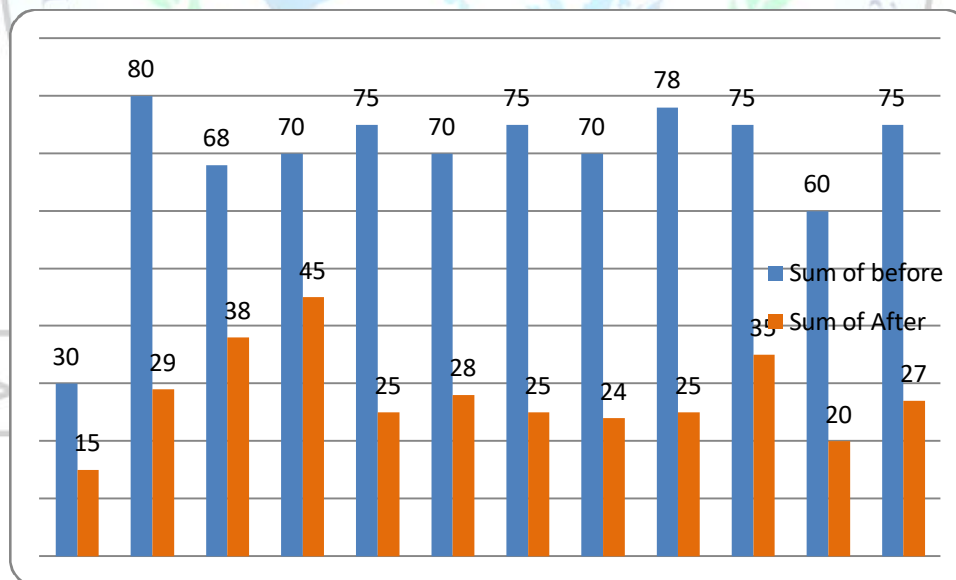
At 5% level value of Chi square =19.6

Calculated value is more than tabulated value

H_0 Null hypothesis is rejected. ISO 9001:2015 standard is essential for the best performance and continual improvement in companies in automotive industry.

Continual Improvement is observed in companies after ISO Certification.

H_a (alternative hypothesis) is accepted.



3.2 Parameters Showing Average Improvement after implementation of ISO Chi square test:

$$= \sum [(\text{Observed} - \text{Expected})^2 / \text{Expected}]$$

For testing null hypothesis, it is assumed that there is no change in performance of companies before and after ISO certification. Rating before ISO is considered expected, and after ISO is considered observed.

Expected are average values observed before certification.

Observed are average values after certification.

Sr. No.	Parameters	X Expected	Y observed	0-E	0-E ² /E
1	Productivity	40	87	47	55.22
2	Work in Progress	30	77	47	73.63
3	Inventory Turnover	35	75	40	45.71
4	Improvement in Share of business	40	88	48	50.85
5	Customer Satisfaction Level	50	95	45	40.50
6	Quality Improvement	25	84	59	139.24
7	Machine Utilization	50	86	36	25.92
8	Communication	40	85	45	50.62
9	Attitude	30	70	40	53.33
10	Product Improvement	40	86	46	52.9
11	Work satisfaction	35	88	53	
				506	665

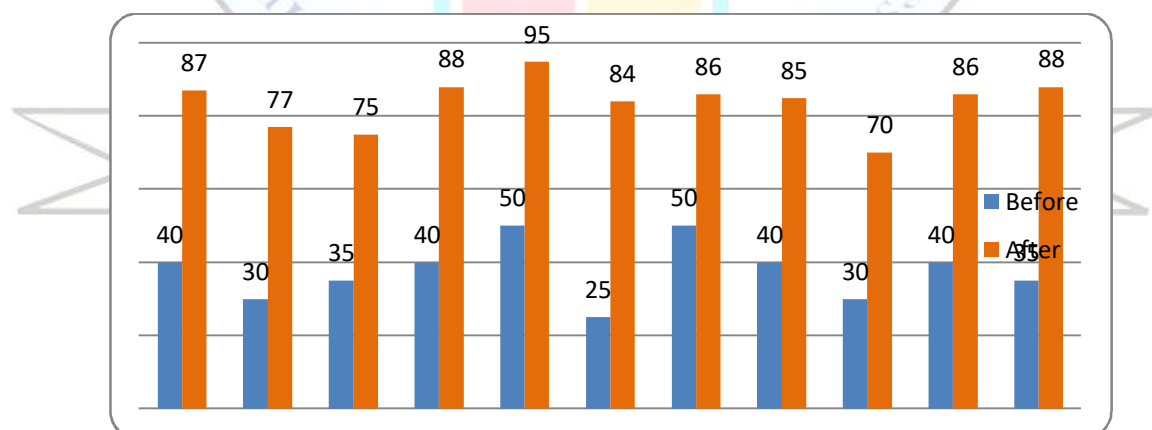
Degree of freedom is $n-1 = 10$,

Tabulated Value of Chi square at 5% level = 18.30

Calculated Value is greater than tabulated value.

Null hypothesis is rejected.

It can be concluded that there is improvement in companies after ISO Certification Standard. H_0 is accepted. ISO 9001:2015 standard is essential for the best performance and continual improvement in companies in automotive industry.



4.0 INTERPRETATIONS, CONCLUSIONS AND SUGGESSTIONS:

The data was collected by way of questionnaire is analyzed and interpreted in this chapter. The response to each question has been analyzed and comments on them are prepared.

The interpretation of statistical data has helped in giving at some concrete findings in present study. 60 questionnaires were administered to medium size companies which are situated in and around Pune Metropolitan City, which are having ISO certification. After receiving the filled questionnaire coding was done. Then the questions are classified and tabulated from different angles. Answers to some questions were suggestive informative and open ended. Views on such questions are given.

The respondent's opinions were considered as base for analysis and interpretation of questions on the answers.

Selected companies products are breaks, Axle, clutch, Rubber springs, Gear, Automotive composite, foundry, forging industry, etc. All companies are supplies for automotive industry.

Companies which were certified for ISO 9001:2015 are taken for study purpose.

It was observed that before certification process, companies have followed processes and procedures from at least last three years.

There is improvement in profitability productivity, inventory turnovers ration as well as reduction in cost of poor quality, internal and external rejection, and expenditure on sales, breakdown time, and costs of spares. These factors indicate the success of certification process in automotive companies.

From Analysis and Interpretation of data it can be observed that effects of certification are positive In all companies. Out of which majority companies are showing 25% to 50% of improvement in performance where as few of the companies are showing 50% to 75% improvement after certification.

There is reduction in Internal Rejection and external Rejection. Cost of poor quality is also reduced. There is improvement in customer satisfaction level, productivity and Share of business. There is improvement in Inventory turnover Ratio and profitability of business.

Reduction in Lead time for development, Improvement in share of business Reduction in Work in progress, Reduction in cost of spares shows that there is improvement in performance of company

4.1 Conclusions:

Quality is a degree to which a set of inherent characteristics fulfills requirements" Grade is inherent in the product whereas quality is dependent upon how well product satisfies the needs. A part of quality management focused on providing confidence that quality requirements can be fulfilled can be called as quality management. A part of quality management focused on fulfilling quality requirements can be called as quality control. Quality assurance happen upstream process where as quality control happens downstream. Effective quality management requires a system that will involve both quality assurance as well as quality control.

Coordinated activities to direct and control an organization with regard to quality can be defined as quality management system.

Quality management principles are customer focus, leadership, Involvement of people, process approach, system approach to management, continual improvement factual approach to decision making and mutually beneficial supplier relationship.

4.2 Suggestions:

- 1) Focus on performance: focus has to be there on performance of the company.
- 2) Focus on Customer specific requirements.
- 3) Reduce cost of certification.
- 4) Perform surprise assessment/checking audits.
- 5) Include commercial department like finance and accounts for profitability purpose.
- 6) Share best practices during audits.
- 7) Try to benchmark process internally and externally.

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