

# INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE & MANAGEMENT

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**STATEMENT OF THE PROBLEM**

**OBJECTIVES**

**HYPOTHESES**

**RESEARCH METHODOLOGY**

**RESULTS & DISCUSSION**

**FINDINGS**

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**QUALITY MANAGEMENT PRACTICES IN MANUFACTURING SECTOR****SUPRIYA CHOPRA****ASST. PROFESSOR****SRI GURU GOBIND SINGH COLLEGE OF COMMERCE****UNIVERSITY OF DELHI****NEW DELHI****ABSTRACT**

*Nurturing the right organizational culture conducive for developing an individual's full potential, fostering of a spirit of cooperation and teamwork, anticipating customer needs and working towards fulfilling them, are all essential elements of the TQM approach. The philosophy of TQM centers around the customer focused approach along with principles of teamwork and regular, continuous improvement. That the TQM approach applied diligently within and outside an organization helps improve its effectiveness seems a good possibility.*

**KEYWORDS**

Quality Management, Quality control, Cronbach, Quality Management Practices Index.

**JEL CLASSIFICATION**

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**INTRODUCTION**

All the activities undertaken by an organization to ensure that a product or service meets a desired or specified standard come under the purview of quality control activity. Quality control is almost as old as the human race. In the ancient times the quality control activity was not performed consciously but was part of every day activities. In recent times quality control has emerged as a primary function in business organizations. It is attributed to various factors such as rapid industrial growth, specialization of labour, technological advancements, precision in and complexity of production, increased consumer awareness, and stiff competitive environment.

Due to the recent economic liberalization measures of the Government, new vistas of international competition have opened up. The globalization of market emphasizes the necessity for Indian business organizations to produce quality goods and services, in order to survive and prosper. The inevitable entry of Multi-national Corporations has threatened their Indian counterparts to wake up to the increasing quality needs of the new breed of customers, who are basking in the safety of protection of consumer rights.

**OBJECTIVES OF THE STUDY**

The main objective of this study is to explore and understand the Quality Management Practices which are prevalent in the selected manufacturing organizations of Delhi and NCR.

1. To study the current quality management practices in the selected manufacturing organizations.
2. To seek opinions of managers in the quality / production area regarding the critical factors of quality management and to develop a measure of quality management practices.
3. To study the influence of size of organization (a company characteristic) on quality management practices.
4. To study the influence of age of the organization (a company characteristic) on quality management practices.
5. To study the influence of industry on quality management practices of the organization.
6. To suggest the measures to strengthen the quality management practices for Indian manufacturing sector.

**RESEARCH METHODOLOGY**

The study uses the Total- Quality Management Assessment Inventory Questionnaire (TQMAIQ) designed through empirical studies by Sashkin and Kiser (1992) comprising 49 items. The 49 items are divided between the two parts of TQMAIQ. The first part has 10 items associated with information on the tools and techniques of TQM used in an organization. The second part consists of the 39 items dealing with an organization's operations, cultural and customers' quality practices.

While this questionnaire may not necessarily be the most exhaustive instrument for providing insights into TQM practices of organizations, in that it does not employ statistically rigorous methodologies such as content analysis for extracting quantitative information from qualitative feedback (Weber, 1990). It does attempt to provide a substantive basis for obtaining information on TQM practices across its key elements, namely organizational culture, customer quality approaches and tools and techniques. The TQMAIQ (Sashkin and Kiser 1992) has been selected for this study as it was believed to be technically, methodologically and theoretically an appropriate way to evaluate TQM practices in the organizations studied.

**RESEARCH DESIGN**

The research design chosen for the present study is an exploratory type. The major objective of the study is to explore what practices are currently being adopted with respect to quality management. Since an exploratory type of research design is framed a large number of manufacturing organizations representing a cross-section of industries are approached. Survey method is used for data collection.

**SAMPLING PROCEDURE**

The present study is confined to manufacturing organizations located in the state of Delhi and NCR. A list of some manufacturing organizations in Delhi and NCR is the sampling frame for this study. The nature of research design is such that non probability sampling procedure is followed. Under this, purposive sampling has been done based on convenience and judgement.

The managers / executives of manufacturing organizations listed in the sampling frame were personally approached. The process of primary data collection was arduous as the response could be received only after repeated visits and reminders through telephone or messengers. A filled up questionnaire could be received only after visiting 4-5 times on an average. Many a times a questionnaire had to be replaced as it was reported to be missing.

Only one questionnaire was to be received from each organization and view point of the manager incharge of Quality Management was sought. The choice of Quality Manager as the respondents from Quality management Department is based on the thinking that he is the only appropriate person in the department to be able to give information regarding policies and intimate activities in his department. In case of organizations where no manager / executive is responsible for the quality department (in very few cases) the production manager was requested to respond to the questionnaire.

The response has been received from 54 organizations. Out of this 6 responses were unusable as information on vital questions was missing. The list of 48 organizations, which is the sample for this study, is included in the Appendix C.

## THE QUESTIONNAIRE

A structured questionnaire was framed to meet specific requirements of the present study. The design of the questionnaire has been kept simple. Both close and open ended questions have been included. A large number of questions are close ended while a few questions in the end are kept open-ended to seek respondent's suggestions and opinion about quality management practices. For all the close ended questions' clear cut instructions have been provided at appropriate places to avoid ambiguity.

## LITERATURE REVIEW

### DEFINITION OF QUALITY

The concept of quality as a transcendent view has been existent from time immemorial, perceived mostly as indicating the goodness of an object (Shewart, 1931). Elaborating on the transcendent view of quality, Shewart mentions,

*"The majority of advertisers appeal to the public upon the basis of the quality of product. In so doing, they implicitly assume that there is a measure of goodness which can be applied to all kinds of products, whether it be vacuum tubes, sewing machines, automobiles, grape nuts, books... Such a concept, is, however, too indefinite for practical purposes."* (p.37).

According to Garvin (1988), the evolution of quality took place through four distinct eras: inspection, statistical control, quality assurance and strategic quality management. The era of skilled craftsmen, handcrafting goods in small volumes was followed in the 1800's by specialization characterized by division of labour and mass production (Bounds et al, 1994). Bounds et al (1994) explain that by early 1900's, gauging and inspection had become more refined as evidenced by the large manufacturing automobile sector in the USA. Explaining this further, they point to Shewart's statistically oriented product-based view of quality as describing a set of characteristics. According to them, the manufacturing-based view of quality focuses on manufacturing and engineering practices, emphasizing conformance to specific requirements and relying on statistical analysis to measure quality. Bounds et al (1994) mention that this was followed by the quality assurance era, especially in the USA where the concept of quality evolved from a narrow manufacturing-based discipline to one with implications for management throughout a firm.

### TOTAL QUALITY MANAGEMENT (MULTIFUNCTIONALITY OF TQM)

It may be useful to consider some of the important aspects of management to comprehend their relevance to TQM, through a study of some of the available literature validating these. According to Powell (1995), these include getting closer to suppliers and customers, executive commitment, employee empowerment and zero defect mentality. It has been suggested that an organization's commitment to quality originated in a quality assurance plan (QAP) focusing on a downstream product checking system, (Hayden, 1992). In Hayden's opinion, QAP found less favour with many customers because it focussed only a project's downstream technical accuracy, leading industries to increasingly adopt TQM within their processes from the beginning. Hayden reiterates the need for senior management to not only commit their financial resources but their personal participation through their own behaviour change.

### EMPLOYEE INVOLVEMENT AND TQM

Magjuka (1993) highlights that a core component in the emerging continuous process improvement strategy of TQM is a direct link between employee involvement programmes (EIP) and TQM objectives.

Ludeman (1992) has found in his study that in the early stages of quality programmes, organizations have significantly more support from executives, managers and employees. According to the author, his study showed that this support gradually declined with time leading to a situation where despite programmes being initially successful, they tended to bog down later on, maybe due to changes in lifestyle not taking place.

Finally, dealing with the importance of inspiring employees towards involving themselves which are said to facilitate the successful implementation of a company wide TQM process, Walker (1992) brings out the need to educate employees to formulate goals and strategy. In the same theme, Waldman (1994) suggests the following as key factors among other things for the success of TQM programmes,

*"Involvement and empowerment of all organizational members in cooperative efforts to achieve quality improvements, the commitment continually to improve employees' capabilities and work processes through training and benchmarking, respectively."* (pp 511-512).

## ANALYSIS AND PRESENTATION

The filled up questionnaires were coded and master data sheet was prepared. The data was tabulated and classified on the basis of company characteristics such as age and type of organizations to fulfill the objectives of the study.

Following statistical analysis methods have been used: percentages, proportions, measures of central tendency, statistical significance test namely, t-test; correlation coefficient and Cronbach's reliability test.

### THE INSTRUMENT FOR MEASURING QUALITY MANAGEMENT PRACTICES

In this section the procedure used for developing an instrument to measure the Quality Management Practices of an organization has been outlined. It is followed by the description of the scoring procedure used to quantify responses of the instrument. In the end, the explanation, calculation and validation of Quality Management Practices Index (QMPI) has been described in detail. The detailed item analysis has been performed to rank both the individual items and factors.

### THE INSTRUMENT

The instrument has been developed which attempts to measure a profile of the business unit's actual level of quality management practices. For developing this instrument the researcher relied on the study conducted by Saraph et al (1989). He has studied the quality management practices in United States based on manufacturing and service organizations. The instrument developed for the present study reflects Indian conditions and realities as it was pretested among Indian professionals. Their view points on quality management practices have been incorporated. Some basic elements of quality management system have been included in the instrument, which are essentially present in organizations of industrially developed countries. The instruments which measure social science variables are developed using the instrumental design method as suggested by the psychologists. For developing measures of the critical factors of quality management, a nine-step process, described by Saraph et al (1989), has been followed.

Fifty three measures in the form of statements were identified as a result of literature survey. After prolonged and intensive discussions with the research supervisor, colleagues and academicians, the number was brought down to 44 statements. The instrument was, then pretested among ten quality / production managers. They were requested to comment on the following aspects of the statements (items): appropriateness, ease of comprehension, readability, wording etc. As a result an inventory of 37 statements has been retained. To enable respondents to indicate the degree of each practice in their organization, a six-point interval rating scale is used. To quantify the responses following scale is used.

The extent for prevailing practice is:

	Not Applicable	Very Low	Low	Medium	High	Very High
Letter Code	NA	A	B	C	D	E
Numerical Score	0	1	2	3	4	5

The option 'Not Applicable' has been given a numerical score of zero for computational convenience.

These 37 statements were then grouped into 8 categories which are termed as the factors of quality management practices. This grouping is similar to the grouping performed by Saraph et al (1989). Table 1 provides brief descriptions of these factors.



TABLE 1: CRITICAL FACTORS OF QUALITY MANAGEMENT

S.NO.	CRITICAL FACTORS OF QUALITY MANAGEMENT	EXPLANATION OF CRITICAL FACTORS
1	The role of management, leadership and quality policy	<ul style="list-style-type: none"> <li>Acceptance of quality responsibility and department heads.</li> <li>Evaluation of top management on quality.</li> <li>Participation by top management in quality improvement efforts.</li> <li>Specificity of quality goals.</li> <li>Importance associated to quality in relation to cost and schedule.</li> <li>Comprehensive quality planning.</li> </ul>
2	Role of the quality department	<ul style="list-style-type: none"> <li>Visibility and autonomy of the quality department.</li> <li>The quality department's access to top management.</li> <li>Use of quality staff for consultation.</li> <li>Coordination between quality department and other departments.</li> <li>Effectiveness of the quality department.</li> </ul>
3	Training	<ul style="list-style-type: none"> <li>Provision of statistical training, trade training, and quality-related training for all employees.</li> </ul>
4	Product / Service design	<ul style="list-style-type: none"> <li>Thorough scrub-down process.</li> <li>Involvement of all affected departments in design reviews.</li> <li>Emphasis on productivity.</li> <li>Clarity of specifications.</li> <li>Emphasis on quality, not roll-out schedule.</li> <li>Avoidance of frequent redesigns.</li> </ul>
5	Supplier quality management	<ul style="list-style-type: none"> <li>Fewer dependable suppliers.</li> <li>Reliance on supplier process control.</li> <li>Strong interdependence of supplier and customer.</li> <li>Emphasis on Purchase policy rather than price.</li> <li>Supplier quality control.</li> <li>Supplier assistance in product development.</li> </ul>
6	Process Management	<ul style="list-style-type: none"> <li>Clarity of process ownership, boundaries and steps.</li> <li>Use of statistical process control.</li> <li>Selective automation.</li> <li>Fool-proof process design.</li> <li>Preventive maintenance.</li> <li>Employee self-inspection.</li> <li>Automated testing.</li> </ul>
7	Quality data and reporting	<ul style="list-style-type: none"> <li>Use of quality cost data.</li> <li>Feedback of quality data to employees and managers for problem solving.</li> <li>Timely quality measurement.</li> <li>Evaluation of managers and employees based on quality performance.</li> <li>Availability of quality data.</li> </ul>
8	Employee relations	<ul style="list-style-type: none"> <li>Implementation of employee involvement and quality circles.</li> <li>Open employee participation in quality decisions.</li> <li>Responsibility of employees for quality.</li> <li>Employee recognition for superior quality performance.</li> <li>Effectiveness of supervision in handling quality issues.</li> <li>On-going quality awareness of all employees.</li> </ul>

The reliability of the instrument was measured by the INTERNAL CONSISTENCY METHOD ([www.statview.com/support/techsup/faq/Calpha/coefalph.shtml](http://www.statview.com/support/techsup/faq/Calpha/coefalph.shtml)) CRONBACH'S COEFFICIENT ALPHA is calculated for the scale based on given sets of items to estimate the internal consistency. Cronbach's coefficient alpha has the most utility for multi item scales. The working of the measurement of Cronbach's alpha for measuring the reliability of the instrument is shown below:

**FORMULA TO CALCULATE THE VALUE OF CRONBACH'S ALPHA**

$$k/(k-1) * [(σ_{xp}^2 - σ_p^2) / σ_{xp}^2]$$

where,

k represent the number of items in the scale,

$σ_{xp}^2$  represent the variance of the total score, and

$σ_p^2$  represent the sum of variances of the items,

The table 2 showing the Mean scores of the Quality Control measures:

TABLE 2: MEAN SCORES OF THE QUALITY CONTROL MEASURES

S.No.	Quality Control Measures	Mean Score	Rank
1	Specificity of Quality goals	4.93	1
2	Clarity of product specifications	4.74	2
3	Coordination	4.74	2
4	Training	4.72	4
5	Visibility of Quality Department	4.70	5
6	Traceability	4.63	6
7	Autonomy	4.55	7
8	Product development process	4.52	8
9	Resources for employee training	4.52	8
10	Understanding of quality policy	4.52	8
11	Recognition of employee's Quality performance	4.50	11
12	Process design	4.46	12
13	Thoroughness of product design	4.42	13
14	Frequency of design changes	4.40	14
15	Efforts to develop quality policy	4.23	15
16	Use of quality data as a tool to manage quality	4.10	16
17	Effectiveness of the quality department	4.08	17
18	Access to the top management	4.06	18
19	Responsibility for quality control programme	4.04	19
20	Availability of quality data	4.01	20
21	Advanced Training	4.00	21
22	Importance of quality	3.99	22
23	Importance of Inspection Review	3.97	23
24	Timeliness of quality data	3.95	24
25	Selection of suppliers based on quality	3.93	25
26	Producibility	3.93	25
27	Thoroughness of supplier rating system	3.87	27
28	Training for basic statistical techniques	3.11	28
29	Reliance on few dependable suppliers	3.05	29
30	Use of acceptance sampling	2.90	30
31	Display of quality related information	2.79	31
32	Use of statistical control charts	2.77	32
33	Preventive equipment maintenance	2.37	33
34	Effectiveness of training	2.37	33
35	Effectiveness of employee involvement programs	2.35	35
36	Participation of workers in quality decisions	2.33	36
37	Employee involvement programs	2.32	37

Here,

$$k = 37$$

$$\sigma_{xp}^2 = 0.723935$$

$$\sigma_p^2 = \sigma_{p1}^2 + \sigma_{p2}^2$$

where, p1 is certain number of items in the scale chosen randomly, here p1 = 26

p2 is the difference between total number of items in the scale and p1, here p2 = 37-26 = 11

$$\sigma_{p1}^2 = 0.11509$$

$$\sigma_{p2}^2 = 0.079056$$

$$\text{Hence, } \sigma_p^2 = 0.703262$$

Substituting the values of k,  $\sigma_{xp}^2$  and  $\sigma_p^2$  in  $\alpha$ , we have

$$\alpha = 0.744044$$

The ideal range of alpha is between 0.5 and 0.9.

The calculated value of alpha for this instrument is within the feasible range that is considered adequate, hence the instrument is judged to be reliable.

#### THE SCORING PROCEDURE

The following scoring procedure has been devised for quantifying the response to the Part C, i.e., the instrument, of the questionnaire:

Aggregate score of an individual organization was calculated by adding the item scores for all the applicable statements and this is termed as Quality Management Practices Score (QMPS). The median value of aggregate QMP scores was calculated and those organizations whose QMP score was less than the median value were termed as organizations having lower level of quality management practices, and the organizations whose QMP score was either equal or higher to the median score were termed as organizations having higher level of quality management practices. Factor wise scores have also been calculated by summing the item score for all the statements pertaining to that factor.

#### THE QUALITY MANAGEMENT PRACTICES INDEX (QMPI)

##### Explanation

The instrument described above lists the practices relevant to the Quality Management. Thirty seven statements have been included in this instrument. The respondents were asked to rate their organization's practices on a six point interval rating scale. With its help a quantitative measure termed as Quality Management Practices Index (QMPI) has been calculated. The QMPI has been considered as criteria for classification of companies.

#### CALCULATION OF QUALITY MANAGEMENT PRACTICES INDEX

For the purpose of developing the Quality Management Practices Index, the following eight factors were identified:

1. Role of Management
2. Role of Quality Department
3. Training of employees
4. Product Design
5. Supplier Quality Management

6. Process Management
7. Quality Data
8. Employee Relations

The instrument contained 37 statements which comprehensively cover facets of these factors which in turn cover Quality Management Practices. To quantify the response a six point scale has been used. Each statement was given a score ranging from 0 to 5. The cumulated score of the respondent has been used as Quality Management Practices Index for each company. The range for QMPS is from zero to one hundred eighty five ( $37 * 5$ ). All the QMPS values have been arranged in ascending order using the Rank function in MS-Excel tool. One of the measures of central tendency, median is taken as a cut-off point to divide the 48 companies into two categories. Median value for these 48 ungrouped observations comes to be 133.5. The companies whose QMPI value was less than 133.5 were classified in low QMPI companies while the companies with QMPI value of 133.5 or more were put in high QMPI companies category.

The Quality Management Practices (QMPS) of all the companies have been arranged in the form of frequency distribution. The results are shown in the following table:

TABLE 3: FREQUENCY DISTRIBUTION OF QUALITY MANAGEMENT PRACTICES SCORE

**Frequency Distribution of QMPS**

Class intervals of QMPS	No. of organizations	% of total
41 - 60	2	4.17
61 - 80	0	0
81 - 100	7	14.58
101 - 120	10	20.83
121 - 140	8	16.67
141 - 160	11	22.92
161 - 180	10	20.83
	48	100

Analysis of the above data reveals that almost 50% of the total respondents fall in the range of 141 to 180 score value of Quality Management Practices.

**EMPIRICAL FINDINGS**

In this very section, the analysis has been done to study the influences of industry, size and age of the organizations on Quality Management Practices Index of the prevalent Quality Management Practices of the respective organizations.

**RELATIONSHIP BETWEEN THE INDUSTRY TO WHICH ORGANIZATION BELONGS AND THEIR QUALITY MANAGEMENT PRACTICES**

TABLE 4: RELATIONSHIP BETWEEN INDUSTRY &amp; THE ORGANIZATION'S QUALITY MANAGEMENT PRACTICES W.R.T THE CRITICAL FACTORS OF QUALITY MANAGEMENT

CRITICAL FACTORS OF QUALITY MGT INDUSTRY		1	2	3	4	5	6	7	8
		The role of management, leadership & quality policy	Role of the quality department	Training	Product / Service design	Supplier quality management	Process Management	Quality data & reporting	Employee relations
1	Automobiles	1	0.98	0.99	1	0.90	0.91	0.87	0.9
2	Auto Ancillaries / Auto components	0.64	0.96	0.68	0.97	0.90	0.89	0.57	0.8
3	Agriculture / dairy	0.24	0.28	0.56	0.37	0.66	0.8	0.67	0.5
4	Cement / Marble / Ceramics / Stones	0.6	0.84	0.8	0.40	0.93	0.8	0.90	0.6
5	FMCG	0.88	0.48	0.8	0.50	0.73	0.82	0.80	1
6	Consumer Goods - Durables	0.76	0.24	0.64	0.80	0.65	0.76	0.27	0.9
7	Electricals & Electronics	0.4	0.96	1	0.87	0.60	0.6	0.37	0.5
8	Garment / Textiles	0.8	0.48	0.44	0.53	0.80	0.88	0.50	0.7
9	Engineering	0.8	0.4	0.76	0.70	0.90	1	0.47	0.9
10	Food Processing / Beverages	0.8	0.76	1	0.87	0.93	0.9	0.97	0.6
11	Paper / Publishing / Printing / Stationary	0.6	0.48	0.8	0.27	0.68	0.64	0.83	0.9
12	Petrochemicals / Oil / Gas / Refineries	1	0.32	0.8	0.70	0.87	0.9	0.83	0.4
13	Pharmaceuticals / BioTech / Research	0.32	0.96	0.84	0.73	0.87	0.83	0.97	0.5
14	IT	0.48	0.8	0.72	0.87	0.73	0.88	0.30	0.8
15	Leather / shoes / Accessories	0.56	0.52	0.72	0.77	0.90	0.52	0.60	0.8
16	Glass	0.2	0.56	0.8	0.27	0.90	0.48	0.60	0.3
17	Chemical	0.36	0.56	0.24	0.53	0.80	0.67	0.90	0.6
18	Iron and Steel	0.92	0.85	0.44	0.87	0.99	0.79	0.43	0.8
19	Capital Goods / Machine Manufacturing	0.92	0.8	0.88	0.73	0.94	0.7	0.70	0.4

TABLE 5: RELATIONSHIP BETWEEN SIZE AND QUALITY MANAGEMENT PRACTICES OF THE ORGANIZATIONS

S.No	Organization	QMPS	No. of employees
1	Hero Honda Motors Ltd.	168	2300
2	Maruti Udyog Ltd.	170	2980
3	Tata Trucks India Ltd.	112	460
4	Escorts Ltd.	171	2687
5	Majestic Auto Ltd.	108	567
6	SAS Motors Ltd.	168	401
7	Auto Pins (India) Ltd.	114	800
8	Rai Prexim India Pvt Ltd.	157	442
9	Sharda Motors Industries Ltd.	144	421
10	JK Tyre Ltd	84	2177
11	Yamaha Motor India Pvt Ltd.	90	1300
12	Imperial Malts Ltd.	90	178
13	ACC Ltd.	112	2036
14	Hyderabad Industries Ltd.	123	482
15	Godfrey Philips India Ltd	110	770
16	Blue Star Ltd.	101	400
17	Godrej Consumer Products Ltd	96	890
18	Controls & Switchgear Co. Ltd	157	427
19	Lumax Industries Ltd.	118	1182
20	Su-Kam Power Systems Ltd.	110	590
21	Schneider Electric India Ltd.	46	400
22	Surya Roshni Ltd.	138	2000
23	Tudor India Ltd. (Prestolite)	94	345
24	Indo Rama Synthetics (India) Ltd.	131	452
25	Bry-Air (Asia) Pvt Ltd.	134	700
26	Jay Bharat Maruti Ltd.	176	2700
27	Spell Organic Ltd.	144	407
28	Manugraph India Ltd.	136	420
29	Yamuna Gases & Chemicals Ltd.	150	455
30	Castrol India Ltd.	169	6500
31	Aventis Pharma Ltd.	162	1877
32	Brawn Laboratories	101	550
33	Moser Baer India Ltd.	155	3798
34	Applied Electro-Magnetics Pvt Ltd.	131	880
35	Avaya Global Connect Ltd	144	426
36	Thunderbird Industries	176	407
37	DCP Group of Companies	90	480
38	Nothern India Leather Cloth Mfg Co. Ltd.	161	461
39	Yamuna Industries Ltd.	160	409
40	Wonder Polymers (P) Ltd.	153	487
41	Asahi India Glass Ltd.	92	880
42	Hindustan Insecticides Ltd.	143	449
43	ElectroSteel Castings Ltd	119	453
44	Jindal Stainless Ltd.	132	1900
45	Saw Pipes Ltd.	161	1500
46	Indian Seamless Steels & Alloys Ltd.	53	220
47	PSL Ltd.	133	200
48	Vestas RRB India Ltd.	152	498

For the purpose of exploring the degree of relationship between size of organizations and the Quality Management Practices following null hypothesis has been formulated:

**H<sub>0</sub>1: THERE IS NO RELATIONSHIP BETWEEN THE SIZE OF THE ORGANIZATIONS AND QUALITY MANAGEMENT PRACTICES.**

For testing the above hypothesis, correlation coefficient has been calculated between the number of employees in an organization and its Quality Management Practices Score. Tests of significance for 'r' have been performed to see whether the correlation is significant.

#### APPLYING t-TEST

Coefficient of correlation 'r' between No. of employees of the organization and its Quality Management Practices:

$$r_{\text{size \& QMP}} = 0.346847 \approx 0.347$$

$$\Rightarrow T_{\text{size \& QMP}} = 2.508133$$

Now, critical value of t at 46 degrees of freedom and 5% level of significance is 2.01.

Here, since significant value, T is greater than the critical value,  $t_{0.05}$ . Hence, the result is significant at 5% level of significance. Therefore, we conclude that the null hypothesis, i.e., there is no relationship between the size of the organizations and quality management practices, is rejected.

Hence, **THE CORRELATION BETWEEN THE SIZE OF THE ORGANIZATIONS AND THEIR RESPECTIVE QUALITY MANAGEMENT PRACTICES IS SIGNIFICANT.**

TABLE 6: RELATIONSHIP BETWEEN AGE AND QUALITY MANAGEMENT PRACTICES OF THE ORGANIZATIONS

S.No	Organization	QMPS	Year of incorporation	Age of the organizations
1	Hero Honda Motors Ltd.	168	1984	22
2	Maruti Udyog Ltd.	170	1981	25
3	Tata Trucks India Ltd.	112	1960	46
4	Escorts Ltd.	171	1944	62
5	Majestic Auto Ltd.	108	1978	28
6	SAS Motors Ltd.	168	1997	9
7	Auto Pins (India) Ltd.	114	1997	9
8	Rai Prexim India Pvt Ltd.	157	1993	13
9	Sharda Motors Industries Ltd.	144	1997	9
10	JK Tyre Ltd	84	1900	106
11	Yamaha Motor India Pvt Ltd.	90	1953	53
12	Imperial Malts Ltd.	90	1998	8
13	ACC Ltd.	112	1936	70
14	Hyderabad Industries Ltd.	123	1997	9
15	Godfrey Philips India Ltd	110	1977	29
16	Blue Star Ltd.	101	1996	10
17	Godrej Consumer Products Ltd	96	1978	28
18	Controls & Switchgear Co. Ltd	157	1998	8
19	Lumax Industries Ltd.	118	1945	61
20	Su-Kam Power Systems Ltd.	110	1997	9
21	Schneider Electric India Ltd.	46	1997	9
22	Surya Roshni Ltd.	138	1950	56
23	Tudor India Ltd. (Prestolite)	94	1997	9
24	Indo Rama Synthetics (India) Ltd.	131	1999	7
25	Bry-Air (Asia) Pvt Ltd.	134	1979	27
26	Jay Bharat Maruti Ltd.	176	1999	7
27	Spell Organic Ltd.	144	1973	33
28	Manugraph India Ltd.	136	1972	34
29	Yamuna Gases & Chemicals Ltd.	150	1973	33
30	Castrol India Ltd.	169	1899	107
31	Aventis Pharma Ltd.	162	2000	6
32	Brawn Laboratories	101	1988	18
33	Moser Baer India Ltd.	155	1983	23
34	Applied Electro-Magnetics Pvt Ltd.	131	1975	31
35	Avaya Global Connect Ltd	144	2000	6
36	Thunderbird Industries	176	2004	2
37	DCP Group of Companies	90	1990	16
38	Nothern India Leather Cloth Mfg Co. Ltd.	161	1998	8
39	Yamuna Industries Ltd.	160	2000	6
40	Wonder Polymers (P) Ltd.	153	2001	5
41	Asahi India Glass Ltd.	92	1984	22
42	Hindustan Insecticides Ltd.	143	2001	5
43	ElectroSteel Castings Ltd	119	2001	5
44	Jindal Stainless Ltd.	132	1970	36
45	Saw Pipes Ltd.	161	1986	20
46	Indian Seamless Steels & Alloys Ltd.	53	1999	7
47	PSL Ltd.	133	1989	17
48	Vestas RRB India Ltd.	152	1987	19

For the purpose of exploring the degree of relationship between age of the organizations and the Quality Management Practices following null hypothesis has been formulated:

**H<sub>0</sub>1: THERE IS NO RELATIONSHIP BETWEEN THE AGE OF THE ORGANIZATIONS AND QUALITY MANAGEMENT PRACTICES.**

For testing the above hypothesis, correlation coefficient has been calculated between the age of an organization and its Quality Management Practices Score. Tests of significance for 'r' have been performed to see whether the correlation is significant.

#### APPLYING t-TEST:

Coefficient of correlation 'r' between No. of employees of the organization and its Quality Management Practices:

$$r_{\text{age \& QMP}} = 0.056693 \approx 0.057$$

$$T_{\text{size \& QMP}} = 0.385127$$

Now, critical value of t at 46 degrees of freedom and 5% level of significance is 2.01.

If the calculated value (or statistical value) of t, i.e., T exceeds  $t_{0.05}$  for (n-2), d.f., we say that the value of r is significant at 5% level. If  $T < t_{0.05}$  the data are consistent with the hypothesis of an uncorrelated population.

Here, since significant value, T is less than the critical value,  $t_{0.05}$ . Hence, the result is not significant at 5% level of significance. Therefore, we conclude that the null hypothesis, i.e., there is no relationship between the size of the organizations and quality management practices, is accepted.

Hence, **THERE IS NO CORRELATION BETWEEN THE AGE OF THE ORGANIZATIONS AND THEIR RESPECTIVE QUALITY MANAGEMENT PRACTICES.**



**RESULT SUMMARY**

The results are summarized as follows:

**TABLE 10: RESULT SUMMARY OF THE T-TEST STATISTICS**

Factor combination	Value of r	Test statistics value	Remarks
Size and QMPS	0.347	2.508	Significant
Age and QMPS	0.057	0.385	Non-significant

The correlation between size of the organization and QMPS was found to be significant at 5% level with 46 degrees of freedom, hence,  $H_{01}$  is rejected and  $H_{02}$  is accepted. It can therefore be inferred that size of an organization (in terms of the number of employees) is positively and significantly correlated to the Quality Management Practices Score. This result corroborates other findings also.

**CONCLUSIONS**

The average Quality Management Practices Score is  $129.98 \approx 130$  for the sample. The results indicate that some confidence is generated in the validity of QMPI instrument developed, on the basis of positive and significant correlation between Quality Management Practices score and respondent's perception of overall effectiveness of quality department.

In the sample organization, the statement "Specificity of quality goals", has emerged at the top with the highest mean score. It indicates that in these organizations, the respondents seem to be more than satisfied with responsibility assumed by their top management and as such their support to the quality programmes in the organizations. To the extent the academicians have reiterated time and again in their writings that top management support is essential for the success of any quality management programme – this finding seems to place the practice, in this respect at a very commendable position. At least, one can not say that top management is indifferent to the quality aspects in their organizations.

However, contrasting situation has emerged with respect to the factor "Employee Relations" which is at the bottom of the rankings. The general condition in Indian organizations is that the Industrial Relations and Human Resource Development aspects are still being given less attention. Finding of this study supports the same general perceived contention. To improve this situation, more efforts should be given to building of employee relations in general and quality department in particular. The employees should be recognized and rewarded for superior quality performance. Culture of mutual trust should prevail.

The small and large size organizations show a significant difference with respect to following factors of quality management: "Training of Employees", "Product Design" and "Quality Data".

As expected, the large companies provide comparatively better training to their employees, better practices relating to product design activities and more systematic in management of quality data. It is quite possible that the practices relating to product design may not be applicable to comparatively small organizations. But training of employees and generation & analysis of quality data are equally relevant and applicable to any manufacturing organization irrespective of size. Therefore it becomes prudent for small organizations, as a matter of fact for all organizations, that they improve practice in respect of these aspects, if at all they are interested in quality development. For the other factors of quality management such as "Role of Quality Department" and "Role of Management" both large and small organizations are reporting higher levels of practices. But, in respect of "Employee Relations" and "Inspection" both large and small sized organizations need to improve their level of practices.

The established and young organizations differ significantly with respect to "Product Design" only. The impact of market competition has been realized more during the last 10 years. World-wide, the competitive organizations have always been coming out with frequent product design changes and new brands and models. Perhaps, that is why the young organizations are attuned to these new philosophies due to the presence of competition. Established organizations, on the other hand, have not been able to overcome inertia. If at all these organizations are willing to take up competition and survive they must revamp their practices, immediately or as long as a long term strategy. Some complacency seems to have set in established organizations which should be overcome more so, in the wake of emerging situations.

Due to foreign collaborations the young organizations were expected to provide higher amount of training to their employees. Although they are rated as better than established organizations, in this regard, the difference is not large enough to be significant.

Most of the young organizations are launched by young breed of entrepreneurs who are relatively younger, more professionally qualified, and their level of awareness is high. Their attitude is reflected in practices of the young organizations. These organizations are supposed to be having more sophisticated technology due to foreign collaborations, which results in better inspection related practices being reported by these young organizations. Established organizations will also have to pay more attention to inspection related practices even if their processes are not that much sophisticated. Any how, they would have to go in for technological up gradation to face the ensuing competition and any home work done towards this aspect of "Inspection" is likely to benefit in their subsequent efforts.

The size of organizations was found to be dependent on the levels of QMPI but the age of organizations was independent of levels of QMPI. This finding consolidates the result that large organizations differ significantly from small organizations with respect to three factors of Quality Management, as described earlier. Age is not such a significant factor, i.e., if both young and established organizations have to survive their level of Quality Management Practices must improve. However in large organizations the risk of failure is high so they are expected to make more efforts in this respect, in order to survive and prosper – this particular attitude seems to be reflected in the findings of this study in the shape of significant difference emerged between large and small organizations.

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In this age of Commerce, Economics, Computer, I.T. & Management and cut throat competition, a group of intellectuals felt the need to have some platform, where young and budding managers and academicians could express their views and discuss the problems among their peers. This journal was conceived with this noble intention in view. This journal has been introduced to give an opportunity for expressing refined and innovative ideas in this field. It is our humble endeavour to provide a springboard to the upcoming specialists and give a chance to know about the latest in the sphere of research and knowledge. We have taken a small step and we hope that with the active co-operation of like-minded scholars, we shall be able to serve the society with our humble efforts.

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