



**Project Completion Report**

**Implementation of Quality Management Practices in  
Performance Improvement of Micro, Small, and Medium  
Enterprises Through Academic Intervention: A Step towards  
Industry Institution Interaction**

***Implemented by***

**Dr V P Wani (PI)**

**MET's Institute of Engineering, Nashik**

**and**

**Dr S D Kalpande (Co-PI)**

**DST PROJECT NO.: DST/NSTMIS/05/161/2014-15**



***Study Sponsored by***

**National Science and Technology Management Information System (NSTMIS)**

**Department of Science & Technology**

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**Citation:**

The report may be cited as DST (2016): Report on “Implementation of Quality Management Practices in Performance Improvement of Micro, Small, and Medium Enterprises Through Academic Intervention: A Step towards Industry Institution Interaction”; Wani, V. P. and Kalpande S. D., MET’s Institute of Engineering, Bhujbal Knowledge City, Nashik, Maharashtra, Project sponsored by DST-NSTMIS, New Delhi, Govt. of India

**Disclaimer:**

Every care has been taken to provide the authenticated information. However, the onus of authenticity of data rests with the PI of the project.

## Preface

This report attempts to identify weight of critical success factors for the successful implementation of quality management practices in micro, small and medium enterprises in Nashik District of Maharashtra State, India. This report prepared in the frame of the Industry Institution Interaction work on 'Implementation of quality management practices in performance improvement of micro, small, and medium enterprises through academic intervention: A step towards industry institution interaction'.

The following 11 member are associated with this project as a local project advisory committee (LPAC). This LPAC team is a combination of industrial, academic, entrepreneur, and scientist-NSTMIS division, Department of Science and Technology along with principal and co-principal investigator of project. The LPAC members are: Mr. M N Bramhankar, Dr. Praveen Arora, Dr. A. N. Rai, Mr. Vijay Joshi, Mr. Dinesh Deogire, Mr. Shrikant Divte, Dr. Jayant Pattiwar, Prof. Yuvraj Chaudhari, Mr. V. A. Upadhyay, Dr. S D Kalpande, Dr. V. P. Wani. The LPAC meetings were conducted periodically at host institution.

The chair of the LPAC was Mr. M. N. Bramhankar, a successful entrepreneur and Managing Director of Electrocrync Contacts India Pvt. Ltd., MIDC Satpur, Nashik and Ex-President of Nashik Industrial Manufacturers' Association.

This report was prepared by Dr. V. P. Wani (PI) and Dr. S D Kalpande (Co-PI) of this project. The report is an analytical and empirical work and analysis of responses to questionnaires and thematic discussions. This report sums up the results of the independent individual desk research and represents experts' opinions.

## **Acknowledgements**

While conducting this research, we received support from many people in one way or another, without whose support, this thesis would not have been completed in its present form. It is our pleasure to take this opportunity to thank all of you.

First and foremost, we would like to express our deeply thank and indebtedness to mentor of this project Dr. A. N. Rai, Scientist-F, Department of Science and Technology, NSTMIS Division. His wide knowledge and logical way of thinking have been a great value for us. His understanding encouraging and personal guidance have provided a good basis for this project work. We would like to express our deep and sincere gratitude to Dr. Praveen Arrora, Scientist-G & Head, NSTMIS Division, Department of Science and Technology. His timely guidance, support and encouragement help us to complete this project. Both of you provided us research directions and freedom to choose the routes that we wanted to investigate. Your encouragement, excellent guidance, creative suggestions, and critical comments have greatly contributed to this work.

We would also like to express our gratitude to Mr. M. N. Bramhankar, Chairman of LPAC and other LPAC members for unfailing support, guidance and continuous encouragement throughout all stages of this project work.

We are grateful to Nashik Industrial Manufacturers' Association (NIMA) for providing facilities to carry out the work. We would also like to express our deep appreciation to respondents, who helped a great deal in our collection of data.

We want to express our sincere thanks to all those who directly or indirectly helped us at various stages of this work.

**Dr. V. P. Wani (PI)**

**Dr. S. D. Kalpande (Co-PI)**

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## **Executive Summary**

### **Importance**

Quality management (QM) is an approach to improving the effectiveness and flexibilities of business as a whole. It is essentially a way of organizing and involving the whole organization. QM ensures that the management adopts a strategic overview of the quality and focuses on prevention rather than inspection. Today, QM has become a part of corporate management on a global scale. The importance of QM lies in the fact that it encourages innovation, makes the organization adaptable to change, motivates people for better quality, and integrates the business arising out of a common purpose and all these provide the organization with a valuable and distinctive competitive edge. A QM system ought to incorporate various tools which can help corporations sustain their standards of quality and compliance with any industry regulations. When all these tools are brought together in a single solution, it can be very simple for a company to enhance productivity and harmonize the relationship between productivity and quality.

Micro, small and medium-sized enterprises (MSMEs) are the engine of the nation's economy. They are an essential source of jobs, create entrepreneurial spirit and innovation in the country and are thus crucial for fostering competitiveness and employment. The MSMEs plays an important role in developing any particular sector, economy of any country, alleviating poverty, increasing employment. Nationwide entrepreneurship development with the appropriate scale, scope and relevance can catapult nation into the higher orbits of socio-economic prosperity.

The challenges and opportunities of economic liberalization and global market have shaken the economies of developing countries like India where industrial growth often gets retarded because of higher population growth, declining GDP, growing inflation, illiteracy and unemployment. In today's dynamically changing society there is an urgent need to create an environment of entrepreneurship to effectively counter these socioeconomic ills. Entrepreneurship is a dynamic process of vision, change and creation. An extensive array of research in the past decade has shown that the entrepreneurial movement led by the small units has contributed significantly to the economic growth of any nation.

There is also a growing worldwide appreciation of the fact that MSMEs play a catalytic role in development process of the most of the economies. This position gets reflected in



the form of increasing number, rising proportion in overall product manufacturing, export and manpower employment by these units. This makes them the backbone of industrial economy in a developing nation like India.

With the advent of globalization and opening up of Indian economy to outside world, competitions among industries have become stiff. To solve their engineering problems they look up now to Engineering Institutions. Similarly, there is an urgent need to prepare engineering students for jobs in companies, by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved well by bridging the gap between industry and the academic institute. There are two key factors that are driving the trend toward industry institute interface. They are the development of technology that allows the academic institute to deliver quality coursework to the worksite and increased competitiveness at companies.

Considering the importance of QM with reference to MSMEs and its need of technological inputs from the academia, the objective of project is to develop a QM model suitable for MSMEs of Nashik District, Maharashtra State.

### **Objectives**

The above introductory background throws up the following broad research objective which this project work has address to developing the QM Model which is applicable for MSMEs in Indian context.

- To ascertain the prevalence of policies and practices in manufacturing MSMEs in industrial sectors, which offer scope for quality performance improvement of MSMEs.
- To identify the strength, weakness, opportunities and threats (SWOT) for SWOT analysis of MSMEs and to carry the situation analysis for building a foundation for good decision making on program priorities and the use of limited resources.
- To develop model which suit to needs of MSMEs and provides useful framework for applicability of QM practices in MSMEs.
- To bring out policy implications to encourage the MSMEs for gradual growth and business development.

### **Methodology**

The methodology used for to achieve the objective by using both qualitative tools (such as SWOT analysis, Interview, Brainstorming sessions, Situation analysis) and quantitative tools (such as Pair-wise Comparison Method (PCM), Analytic Hierarchy Process (AHP)) to developed the QM model which is suitable for MSMEs.

The survey method has used for collection of data. After identifying the target segment approved questionnaire has used to collect data from the selected sample of MSMEs. The data is collected through the three phase of questionnaire.

The objective of first part of questionnaire was to know the present status of quality management, working environment, co-relation of quality with income which decided to investigate the present status of quality system in MSMEs. It also tries to know the quality affecting parameters and variables in quality management and major barriers in the adoption of QM in MSMEs. The objective of second part of questionnaire was to know the present status of MSMEs. After SWOT analysis the situational analysis carried out to get insights into MSMEs status. The last part of questionnaire answer the question how can the attributes of QM are integrated in to a model for attaining QM practices within target MSMEs. The data was collected for to develop an instrument which could measure the progress of a unit towards the QM philosophy. The AHP tool is used for development of QM implementation model which uses and explicit the weightage system of its components by pair-wise comparison method. The paired comparison method was adopted as it is simple to administer to a generalist target group and provides reasonable confidence. The relative weights or priorities were obtained by taking the opinion of experts from the field of quality management.

### **Results & Discussions**

The data was collected through the questionnaire and analysed. Even though MSMEs have recognized the importance of quality management and adopting new approaches, but yet many MSMEs are still using 'Traditional approach' for managing quality. The result of shows that two quality approaches are commonly used by Nashik district MSMEs i.e. traditional approach (46.54%) and ISO certification (32.72%). Only 14.29% MSMEs are used TQM and TQC approach. Many MSMEs have no formal quality control department. In many MSMEs the quality control manager is not well qualified. Poor information on QM (35.94%), low level of awareness and understanding of quality among employees (28.11%), lack of employee cooperation (23.50%) and lack of management commitment (17.97%) are observed to be the main barriers in the adoption of QM philosophy. Competition (54.84%); need to reduce cost (28.11%); customer satisfaction (35.48%) and reputation (7.83%) are found to be the most important motivational factors for quality improvement. From survey it is identified that about 93.55 % of the respondents have

written specifications in terms of quality tolerance limit for all products. With respect to organizational structure and management system, Target MSMEs are trying to put emphasis on management commitment, process control, employee commitment, use of SQC techniques and training for improving the quality of product.

From above study it is observed that the present situation of MSMEs is not very satisfactory; nevertheless it seems that all the problems existing presently can be overcome through education, communication, participation and facilitation. On this background, it is felt that there is a need for detail study of MSMEs to identify its strength, weakness, opportunities and threats (SWOT). The situation analysis helps for examination of current situation of MSMEs and external environment. It has identified that the major opportunities lie in the utilization of financial and non-financial support extended by government and gain vast export market. Owner management and flexibility are the some other areas, which provide opportunities for growth. The major external issues identified for the MSMEs of this region are competition from large and multinational organization, export market and rise in expectation of customer. The major internal issues are lack of financial strength, lack of quality consciousness, lack of financial strength, lack of quality work culture and need of trained workers.

To succeed in any field, weakness must be overcome through strength and threats must be transferred into opportunities. In the light of the above considerations, the need for quality initiatives in MSMEs was felt.

The purpose of creating this model was to set a challenge for industry to scale new heights of quality and leadership. This analytical study is carried out by using the paired comparison method (PCM) of Analytic Hierarchy Process (AHP). This exercise determines ranking of the various criteria according to their importance. For the purpose of researching the value of QM in MSMEs the framework of S-P model is used. The data were collected by quality experts from MSMEs through a well-designed questionnaire. The final weightage of attributes was carried out by PCM of AHP. In one point scale understanding of customer need (CN) has got highest weightage of 0.294 and ranked first. Customer need fulfillment ability (CA) has got weightage of 0.282 and ranked second, whereas common understanding of quality (UQ) has ranked three with weightage of 0.202. The other attributes viz. use of team process (TP), understanding of the organizational process (OP), focus on internal customer (FI), emphasis on the use of data (UD), understanding of techniques of improvements (TI), variability reduction

ability of product to provide greater reliability (VA), improvement ability (IA) has got the weightage of 0.156, 0.154, 0.149, 0.139, 0.129, 0.126, and 0.101 respectively. The attribute supplier partnership (SP) and ability to reduce waste (AW) has ranked last with the weightage of 0.089 and 0.087.

### **Policy implication**

The AHP model developed here can be useful for assessing the organizations on the basis of components of quality management. It can also identify the degree to which the various components of QM are present in the organization. Such a study can explore the degree of the impact of QM implementation on overall business performance and help in identifying problem areas and possible remedies. It can also be used to compare the MSMEs on the basis of QM variables and evaluate the status of QM for the given set of attribute. A developed model is very simple to understand and operate. It will be definitely help to MSMEs in their journey of QM.

## CHAPTER 1: Introduction

Micro, Small and Medium Enterprises (MSMEs) are the engine of the nation's economy. They are an essential source of jobs, create entrepreneurial spirit and innovation in the country and are thus crucial for fostering competitiveness and employment. It plays an important role in developing any particular sector, economy of any country, alleviating poverty, and increasing employment. Within last few years many developed and developing countries have realized the importance of this sector. Fast decision making due to less staff, availability of raw material, innovative products which cater to the needs of a particular region and its vicinity, are certain key factors making MSMEs significant. Furthermore, economic factors which constitutes to development of the sectors are, addition of output of goods and services to economy, low capital cost for establishment, reduction in income disparities, and admirable propagation ground for entrepreneurial talent.

In India, Small sector Industrial (SSI) sector plays an vital role for growth of economy by contributing 45% of industrial output, 40% of exports, 42 million in employment, create one million jobs every year and produces more than 8000 quality products for Indian and international markets ([shttp://www.msmechamberofindia.com](http://www.msmechamberofindia.com)). As a result, MSMEs are today exposed to greater opportunities for expansion and diversification across the sectors.

Notwithstanding the fact that government of developed and developing countries have taken various initiatives, and, on regular intervals have provided support, however, still a lot needs to be done. It is also observed that many MSMEs are sick and some are close down. It is felt that, the main problem of those MSMEs were low quality of their product and rise in competition in the market. To overcome this situation, MSMEs need to adopt a policy of meeting needs of customer through continuous improvements. It is expected that the policy and practice of Quality Management (QM) would help in achieving this.

There is no doubt that quality has become a major feature in the survival plan of many organizations. QM is a powerful technique for monitoring, managing, analyzing and improving the process performance for a business venture. Many firms have arrived at the conclusion that effective QM implementation can improve their competitive abilities and provide strategic advantages in the marketplace and can allow firms to compete globally. It has observed that QM implementation has led to improvements in quality, productivity.

and competitiveness and also achieved 90% improvement rate in employee relations, operating procedures, customer satisfaction, and financial performance.

On a global scale, QM is a well-established field of study nevertheless its popularity and success rate of implementation is not very high. In general, the implementation emphasis of QM has been prescriptive. This study can explore the degree of the impact of QM implementation on overall business performance in firms and help in identifying problem areas and possible remedies.

### **1.1 Effect of QM Implementation**

QM has been widely implemented throughout the world. Many firms have arrived at the conclusion that effective QM practices implementation can improve their competitive abilities and provide strategic advantages in the marketplace (Anderson et al., 1994; Lewis et al., 2005). Several studies have shown that the adoption of QM practices can allow firms to compete globally (Easton, 1993; Handfield, 1993; Hendricks and Singhal, 1996, 1997; Womack et al., 1990; American Quality Foundation and Ernst and Young, 1991). Several researchers also reported that QM implementation has led to improvements in quality, productivity, and competitiveness in only 20% to 30% of the firms that have implemented it (Benson, 1993; Schonberger, 1992, Yusof and Aspinwall, 2000, Umesh et al., 2000). A study conducted by Rategan (1992) indicated that 90% improvement rate in employee relations, operating procedures, customer satisfaction, and financial performance is achieved due to QM implementation. Longenecker and Scazzero (1993) indicated that achieving high product quality and pursuing successful QM implementation are highly dependent on top management support. Many researchers suggested that effective product design can lead to the improvement of product quality (e.g., Gitlow et al., 1989; Juran and Gryna, 1988, Cao et al., 2000, Reed et al., 2002); whereas Motwani et al., (1994) reported that there is no relationship between systematic product design and the level of product achieved. Thus, conflicting research findings have been reported surrounding the effects of QM implementation on overall business performance (Rungtusanatham et al., 1998).

These seemingly conflicting results were also found in Indian manufacturing firms. QM has been introduced in India in 1980s. In order to encourage firms in implementing QM, great efforts have been made by Indian government. According to Lakhe and Mohanty (1994), and Deshmukh and Lakhe (2010), central India still lacks effective QM systems

and application at the firm level. Some basic quality principles and modern quality management methods have not been widely used by India's manufacturing MSMEs.

The existing literature shows that very few QM implementation models are developed for MSMEs and no large scale empirical research has been systematically conducted dealing with QM implementation in Indian manufacturing MSMEs. In order to bridge this gap, an investigation into the successful implementation of QM in Indian manufacturing MSMEs is truly needed. Such a study can explore the degree of the impact of QM implementation on overall business performance in firms and help in identifying problem areas and possible remedies.

The faltering success of QM has led many researchers to establish relationships between QM and contextual factors such as culture (Lakhe and Mohanty, 1994; Pun, 2001; Sahay and Walsham, 1997; Sila and Ebrahimpour, 2002), leadership (Rao et al., 1997; Zairi, 2002), teamwork (Eisenhardt and Tabrizi, 1995; Quazi et al., 2002) and training (Palo and Padhi, 2003). The personality profile of managers (Krumwiede and Lavelle, 2000) and the host country culture have been found to have a bearing on the adoption or success of QM (Yen et al., 2002). Researchers (Saunders and Preston, 1994; Watts and Dale, 1999; Hellsten, 1997) have looked at the specific problem of QM implementation in MSMEs and tried to analyze whether QM implementation requires a different orientation in MSMEs. Another stream of research has been conducted to arrive at empirically validated factors that influence successful implementation of QM (Saraph et al., 1989; Black and Porter, 1996; Wali et al., 2003).

Literature shows that MSMEs play an important role in the development of economy (Ghobadian and Gallea, 1996). In spite of success stories of QM, still the concept has not been really adopted by MSMEs (Dale and Duncalf, 1984; Deshmukh and Lakhe, 2010). The main reasons for low use of QM in MSMEs are, cost constraints and lack of resources; lack of information on QM, specially oriented to MSMEs; and lower level of awareness and understanding.

Looking from this perspective, there seems to be a need to understand successful implementation of QM for MSMEs in Indian context.

## **1.2 Industry Institute Interaction**

A productive interface between academia and industry, in the present times of knowledge economy, is a critical requirement. The industry academia interface is all about knowledge transfer and experience/technology transfer. Better interaction between Technical institutions and industry is the need of the hour. This will have great bearing on the Engineering Curriculum, exposure of industrial atmosphere to engineering students. With the advent of globalization and opening up of Indian economy to outside world, competitions among industries have become stiff. To solve their engineering problems they look up now to Engineering Institutions. Similarly, there is an urgent need to prepare engineering students for jobs in companies, by exposing them to newer technologies and engineering methodologies. These objectives can only be achieved well by bridging the gap between industry and the academic institute.

There are two key factors that are driving the trend toward industry institute interface. They are the development of technology that allows the academic institute to deliver quality coursework to the worksite and increased competitiveness at companies.

This SSI sector may need technological inputs from the academia in certain identified niche areas. The Industry Institute Interaction prepared to offer them for this endeavor, and then it is imperative that they develop systems and procedures to ensure that industry expectations are met without any compromise on academic aspirations.

## **1.3 Objectives**

The above introductory background throws up the following broad research objective which this project work has address to developing the QM Model which is applicable for MSMEs in Indian context.

In this new era of global competition, Indian MSMEs can be longer be satisfied with the delivery of goods and service that match or just improve on those of their competitors. Nevertheless the competition has now shifted from the basis of price alone to price and quality. The success of the organizations depends on whether they have a rational method of pursuing improvement and their relative rates of improvement. Adopting the QM philosophy, provide MSMEs with a rational way of improving their goods and services and enhancing their competitive position.

Considering the importance of QM in Indian context and its reference to MSMEs, the topic is selected for the research.



- To ascertain the prevalence of policies and practices in manufacturing MSMEs in industrial sectors, which offer scope for quality performance improvement of MSMEs.
- To identify the strength, weakness, opportunities and threats (SWOT) for SWOT analysis of MSMEs and to carry the situation analysis for building a foundation for good decision making on program priorities and the use of limited resources.
- To develop model which suit to needs of MSMEs and provides useful framework for applicability of QM practices in MSMEs.
- To bring out policy implications to encourage the MSMEs for gradual growth and business development.

The methodology used for to achieve the objective by using both qualitative tools (such as SWOT analysis, Interview, Brainstorming sessions, Situation analysis) and quantitative tools (such as Pair-wise Comparison Method (PCM), Analytic Hierarchy Process (AHP)) to developed the QM model which is suitable for MSMEs.

#### **1.4 Limitations**

The limitation of this project is summarized are:

- i. Study is limited to Nashik District of Maharashtra State only.
- ii. Study is limited to MSMEs in manufacturing sector.
- iii. Framework developed here can be extended and used for any type of MSMEs after identification of critical success factors.
- iv. The findings from the project can be useful for MSMEs as well as for Academic Institutions in Quality Improvement and Industrial Exposure respectively.

\*\*\*\*\*

## **CHAPTER 2: Review of Literature**

This research aims at studying MSMEs and QM practices for identifying the ways for effective implementation of QM. The finding of the literature show that there is a need of QM model specially developed for MSMEs.

### **2.1 Entrepreneurial Synergy of MSMEs**

The challenges and opportunities of economic liberalization and global market have shaken the economies of developing countries like India where industrial growth often gets retarded because of higher population growth, growing inflation, illiteracy and unemployment. In today's dynamically changing society there is an urgent need to create an environment of entrepreneurship to effectively counter these socioeconomic ills (Sanghvi, 1996). Entrepreneurship is a dynamic process of vision, change and creation. An extensive array of research in the past decade has shown that the entrepreneurial movement led by the small units has contributed significantly to the economic growth of any nation.

These enterprises serve as the seedbed of entrepreneurship due to following features:

- They create more employment opportunities with comparatively low capital investment;
- MSMEs units are generally local resources/demand based;
- They can be located anywhere more easily, resulting in horizontal growth and removal of regional imbalance;
- This sector gives quick returns and has a shorter gestation period;
- These units helps to maintain/ retain traditional skills and handicrafts;
- These units assist large industries by acting as ancillaries.

There is also a growing worldwide appreciation of the fact that the MSMEs play a catalytic role in development process of most of the economies. This position gets reflected in the form of increasing number, rising proportion in overall product manufacturing, export and manpower employment by these units. This makes them the backbone of industrial economy in a developing nation like India.

Throughout the world economics are to a large extent dependent on the success of MSMEs. In UK, MSMEs together accounted for 99.9 % of all enterprises, more than half of the employment (59.9%) and turnover (49%) (BIS, 2010). Table 2.1 shows the

country wise contributions of SSI in nation's economy. In Japan 72% of the entire workforce is engaged in MSMEs, whereas in USA and Korea 53% and 51% respectively. From Table 2.1, it is observed that SSI plays an important role in the development of nation's economy.

Table 2.1: Contributions of SSI in Respective Nation's Economy

Country	Share of Total			Criteria for Recognition
	Output	Employment	Export	
India	40%	45%	35%	Fixed assets
USA	--	53%	--	Employment
Japan	52%	72%	13%	Employment and assets
Taiwan	81%	79%	48%	Paid up capital, assets and sales
Singapore	32%	58%	16%	Fixed assets and employment
Korea	33%	51%	40%	Employment
Malaysia	13%	17%	15%	Shareholder fund and employment
Indonesia	36%	45%	11%	Employment

Source: Laghu-Udyog, Volume, 26 (6), 2008

## 2.2 Performance and Importance of Indian MSMEs

As per Nimbalkar (2001), within the MSME sector, the small-sector is a green field for nurturing of entrepreneurial talents and helping the units to grow in size. In developing countries like India, small-scale industry is the potent way by which maximum employment can be generated with comparatively low investment. It is also helpful in removal of regional imbalance in industrial development. The performance of SSI sector in terms of critical parameters such as number of units, production, employment generation and export is significant. In India, MSMEs play a vital role for the growth of Indian economy by contributing 45% of the industrial output, 40% of exports, 42 million in employment, create one million jobs every year and produces more than 8000 quality products for Indian and international markets. As a result, MSMEs are today exposed to greater opportunities for expansion and diversification across the sectors (<http://www.msmechamberofindia.com>). Table 2.2 represents the performance of small scale sector in terms of critical parameters such as number of units, production, employment generated and export during the last decade.

Table 2.2: Year wise Growth of SSI Units in India

Year	No. of Units of MSMEs Working Units (Million)			Production at (Rs. Billion)		Employment (Million Person)	Exports (Rs. Billion)
	Regd.	Un-Regd.	Total	Prices			
				Current	Constant		
1990-91	0.79	6.00	6.79	635.18	682.95	15.834	966.4
1991-92	0.87	6.19	7.06	730.72	791.80	16.599	1388.3
1992-93	0.99	6.36	7.35	855.81	935.23	17.484	1778.3
1993-94	1.06	6.59	7.65	988.04	988.04	18.264	2530.7
1994-95	1.16	6.80	7.96	1222.10	1091.16	19.140	2906.8
1995-96	1.16	7.12	8.28	1482.90	1216.49	19.793	3647.0
1996-97	1.20	7.42	8.62	1634.13	1353.30	20.586	3924.9
1997-98	1.20	7.77	8.97	1891.78	1478.24	21.316	4444.2
1998-99	1.20	8.14	9.34	2129.01	1594.07	22.055	4897.9
1999-00	1.23	8.48	9.71	2342.55	1707.09	22.910	5420.1
2000-01	1.31	8.80	10.11	2612.89	1844.28	23.909	6979.7
2001-02	1.37	9.15	10.52	2822.70	1956.13	24.909	7124.4
2002-03	1.59	9.36	10.95	3119.93	2106.36	26.021	8601.3
2003-04	1.70	9.70	11.40	3514.27	2263.81	27.142	9764.4
2004-05	1.85	10.11	11.86	4182.63	2515.11	28.257	12441.7
2005-06	1.87	10.47	12.34	4762.01	2776.68	29.491	NA
2006-07	NA	NA	36.17	NA	NA	80.52	NA
2007-08	NA	NA	37.73	NA	NA	84.22	NA
2008-09	NA	NA	39.37	NA	NA	88.11	NA
2009-10	NA	NA	41.08	NA	NA	92.21	NA
2010-11	NA	NA	42.87	NA	NA	96.56	NA
2011-12	NA	NA	44.77	NA	NA	101.25	NA
NA- Not available							
Source: SIDO Half Century by DCSSI, GOI, 2004 and Economic Survey, GOI, 2006-07, ( <a href="http://www.scribd.com">http://www.scribd.com</a> ) & Annual report 2012-13, GOI, Ministry of MSME							

From Table 2.2 it has observed that number of number of working units of SSI are doubled in the period 1990 to 2008 and generates more employment. It has created 100% more employment over the period of time and provides employment to 32.22 Million people. The demand of SSI product in international marker is increasing continuously and the export increase by twelve times more in the year 2004-05 than that of year 1990-91. The production has increase four times more over the period 1990–2006. As a corollary of the above fact, the graph of number of units, production, export and employment has continuously increasing. This shows the economic growing importance of SSI.

In the growing economic disparity, Indian MSMEs will have to play a far more significant role in the future, both in terms of employment generation as well as contribution to India's overall GDP and exports. If India takes a holistic and pragmatic approach to creating new enterprises, while supporting the growth of the existing MSMEs base, India is aspiring to grow its economy by 9 % or more over the next decade. To achieve this level of overall GDP growth, assuming a steady growth of 2.5 % and 8 % in the agriculture and services/manufacturing sectors respectively, the MSMEs sector (both existing and new enterprises) would need to quadruple its GDP contribution from the current level of USD 200 billion. This would mean that both existing and newly created enterprises could contribute as much as 28 % of India's GDP by the year 2020, when the overall economy is expected to reach USD 2.8 trillion from the current base of USD 1.2 trillion in FY 2008-09. India can achieve its socio-economic objectives by focusing on gainful employment for millions of educated youth and by helping millions of others transition from an overburdened agricultural sector to the small-scale manufacturing and service sectors in the next decade.

A strategic and holistic approach of encouraging entrepreneurship can tap into India's entrepreneurial gene and redirect a few million of the job seekers into jobs creators. Nationwide entrepreneurship development with the appropriate scale, scope and relevance can catapult India into the higher orbits of socio-economic prosperity (Tanuku, 2010). Figure 2.1 shows the MSMEs contribution to projected GDP growth in the next ten year and may contribute up to 30% in total GDP growth.

The small scale industry sector in India, generally termed as small-scale units (including tiny sector), has emerged as the most dynamic and vibrant sector in recent years. This sector is defined by the criteria of scale of capital investment, unlike in many other

countries where they go by different criteria for identifying small and medium scale units (Mukharjee, 2001).

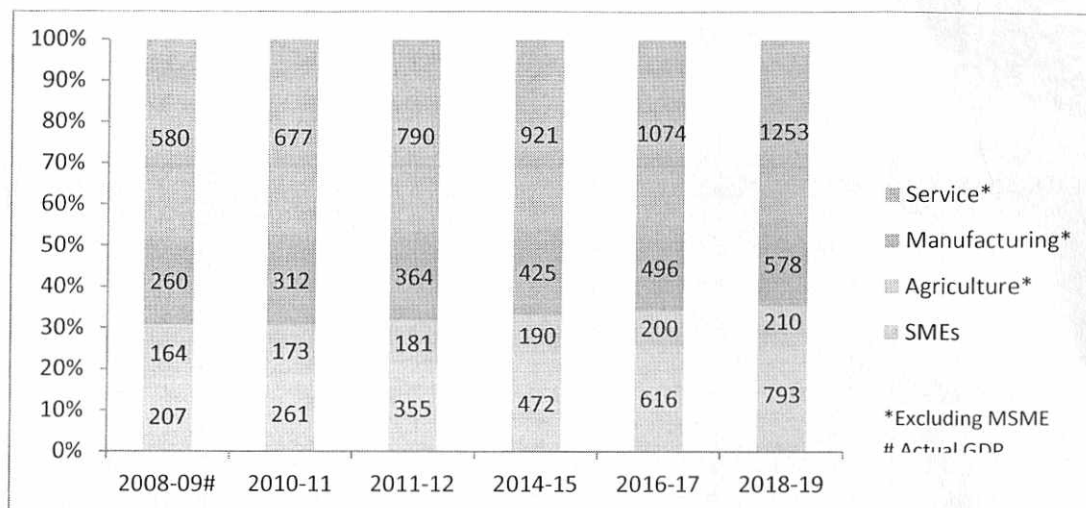


Figure 2.1: MSME Contribution to Projected GDP Growth in Next 10 Year

Source: Tanuku, 2010

These criteria include number of workers employed, level of output/production, level of exports for export oriented units (EOU), space requirement and so on. Accordingly to the newly enacted Micro, Small and Medium Enterprises Development Act 2006, which had come into effect from October 2, 2006, enterprises are classified into Micro, Small and Medium according to the following criteria are shown in Table 2.3.

Table 2.3: Classification of MSME According to Criteria

Types of Enterprises	Engaged in manufacturing and production of goods.	Engaged in providing or rendering of services.
		Investment in plant and machinery
Micro Enterprises	Does not exceed Rs.25 Lakh.	Does not exceed Rs.10 Lakh.
Small Enterprises	More than Rs.25 Lakh but does not exceed Rs. 5 Crore.	More than Rs.10 Lakh but does not exceed Rs. 2 Crore.
Medium Enterprises	More than Rs.5 Crore but does not exceed Rs.10 Crore.	More than Rs.2 Crore but does not exceed Rs.5 Crore.

Source: STMSME Report for the Eleventh Five Year Plan (2007-2012)

### 2.3 Challenges and Opportunities of MSMEs

Contemporary transformation of the business environment due to liberalization, privatization and globalization has increased competitive pressure on the MSMEs in

India. MSMEs are facing an entirely new paradigm of competitive threats like major shift in product and process technology; changes in preference from customer segment; increased customer awareness etc. Under the changed circumstances, ability to generate and utilize knowledge is the only way to sustain one self. Technological innovation is a key to survival and growth for small enterprises in India and so technical entrepreneurship plays a pivotal role in the process of industrialization (Wani et al., 2002). The Government of India (GOI) ever since independence has consistently encouraged this sector as is evident from the policies framed from time to time through the industrial policy of 1956 and 1977. The basic accent of Indian policy for small scale sector had been defensive, aiming to protect this sector from the dynamics of the competitive growth. The changing economic and liberalized scenario has removed this protection. The new environment for small-scale industries consists of changes emerging from the ongoing process of economic reforms conforming to the World Trade Organization (WTO) agreement and to the fast changing economic, technological and information environment. In this process, according to Vasundhara (2000), the liberalized policy has posed certain challenges and provided opportunities to the MSMEs. The challenges are in the form of increased competition; reduced protection due to lowering of tariffs and market determined rates of interest. On the other hand opportunities have come in the form of access to better technology, availability of raw material and components, impetus to quality, efficiency and opportunity to restructure and diversify. Further the challenges and opportunities to MSMEs can also be expressed as:

#### *Opportunities*

- Owner is entrepreneur, combines managerial as well as technical aspects; Management of change is very easy;
- Technology transfer is very easy;
- The organization is extremely flexible;
- It provides a vital support for large scale industries;
- It can acts as a catalyst in regional development by removing the industrial imbalance.

#### *Challenges*

- Increased competition (both domestic and international) in most of the spheres of manufacturing activities including those in rural area;

- Increased penetration of branded consumer product from large scale industries;
- Deep penetration of media increased awareness of consumers leading to: quality consciousness; preference for branded products; wider choice of brand/product and services to satisfy similar needs;
- Limited scope for quality price trade off;
- Increased purchasing power among the rural populace/masses.

These challenges are resulting in widespread sickness in this sector. Sickness in industrial sector results in locking up of resources, wastage of capital assets, loss of production and increasing unemployment, besides affecting the circulation of bank credit. Table 2.5 reflects the magnitude and nature of sickness and its growth in the last ten years as per Reserve Bank of India (Singh, 2010).

Table 2.5: Sickness in SSI in India

Year	Sickness Details		Potentially Viable Units	
	Units (No.)	Outstanding Amount (Rs. Crore)	Units (No.)	Outstanding Amount (Rs. Crore)
1998	268815	3547.16	15539	597.93
1999	262376	3721.94	16424	635.82
2000	235032	3609.20	16220	479.31
2001	221536	3856.64	18686	455.96
2002	306221	4313.48	18692	376.96
2003	304235	4608.43	14373	369.45
2004	249630	4505.54	13076	399.17
2005	177336	4818.95	4493	416.41
2006	167980	5706.35	3626	624.17
2007	138811	5284.54	2385	421.18
Note: These units include village industries as well				
Source: Singh, 2010				

The sickness of SSI table shows that after year 2003 the number of sickness units has reduced following a period of consistent growth from 1998 to 2007. The percentages of potentially viable units are very low and needs attention.



Study reports (Vidya and Shashidhar, 2005), shows that in India numbers of MSMEs are increasing every year. In spite of this, it is also observed that many MSMEs are sick and some are close down. It is felt that, the main problem of those MSMEs were the low quality of their product and rise in competition in the market. To overcome this situation, MSMEs need to adopt a policy of meeting needs of customer through continuous improvements. It is expected that the policy and practice of QM would help in achieving this.

#### **2.4 Overall Trend of R and D Performance in MSMEs**

It is no longer feasible for MSMEs in emerging economies like India to take refuge in policy protection as current economic openness policies saw the removal of special treatment to MSMEs in industrial policies like exemption from price controls, product reservation, preference in government procurement, etc. They can use the competitive strategy of reverse engineering and innovative cost-effective processes to survive under the new technology policy regime. Therefore MSMEs are required to develop or acquire necessary competitive resources like new technologies to compete with large national firms, foreign firms and cheap imports. Rapidly changing consumer preferences, shorter product life cycle and growing quality consciousness clearly call for MSMEs to upgrade their technological assets.

Technology has come to be a critical strategy for national firms' growth and survival in the last two decades of liberalization process. The period since early 1990s is a crucial phase of competitive restructuring in Indian domestic market place with large scale entry and expansion of foreign firms, inflow of cheap imports and emergence of product patent regime. These changes in policy framework throw critical challenges to domestic MSMEs to upgrade their technological and skill capability urgently. R and D is being the main driver of enhancing competitiveness. The trends of R and D intensity of Indian manufacturing firms across different sizes have been presented in Figure 2.2 and details of R and D performance of Indian manufacturing firms is shown in Table (2.6).

Table 2.6: R & D Performance of Indian Manufacturing Firms over Sizes, 1991-2008, (Number, Percent)

Year	Small Firms					Medium Firms					Large Firms				
	Number			R&D Intensity (%)		Number			R&D Intensity (%)		Number			R&D Intensity (%)	
	All	R & D Doing	% Share of R&D firms	All	R & D Doing	All	R & D Doing	% Share of R&D firms	All	R & D Doing	All	R & D Doing	% Share of R&D firms	All	R & D Doing
1991	426	10	2.35	0.01	0.61	234	6	2.56	0.02	1.31	1,436	52	3.62	0.064	0.375
1992	512	30	5.86	0.08	0.47	278	13	4.68	0.03	0.76	1,582	173	10.94	0.126	0.544
1993	701	51	7.28	0.10	0.41	357	33	9.24	0.12	0.71	1,799	361	20.07	0.201	0.374
1994	1013	57	5.63	0.09	0.38	481	36	7.48	0.09	0.78	2,150	449	20.88	0.217	0.436
1995	1367	94	6.88	0.13	0.47	584	69	11.82	0.20	0.98	2,347	579	24.67	0.241	0.431
1996	1419	108	7.61	0.13	0.51	592	71	11.99	0.23	0.98	2,341	629	26.87	0.301	0.471
1997	1265	102	8.06	0.17	0.62	547	67	12.25	0.17	0.82	2,310	730	31.60	0.374	0.527
1998	1264	90	7.12	0.13	0.51	535	60	11.21	0.11	0.61	2,381	735	30.87	0.317	0.438
1999	1455	88	6.05	0.12	0.59	583	68	11.66	0.13	0.62	2,596	737	28.39	0.333	0.477
2000	1514	83	5.48	0.08	0.42	611	72	11.78	0.13	0.73	2,682	704	26.25	0.268	0.411
2001	1472	74	5.03	0.07	0.63	603	61	10.12	0.11	0.78	2,669	693	25.96	0.260	0.371
2002	1558	96	6.16	0.10	0.66	603	64	10.61	0.10	0.65	2,691	816	30.32	0.302	0.417
2003	1898	102	5.37	0.12	0.87	676	72	10.65	0.14	0.96	2,871	855	29.78	0.353	0.475
2004	2121	98	4.62	0.11	0.79	667	67	10.04	0.10	0.80	2,830	853	30.14	0.413	0.553
2005	2063	82	3.97	0.10	0.87	615	50	8.13	0.10	1.10	2,709	804	29.68	0.403	0.539
2006	1704	66	3.87	0.09	0.90	553	47	8.50	0.13	1.06	2,602	784	30.13	0.563	0.762
2007	1308	56	4.28	0.10	1.08	445	47	10.56	0.14	1.00	2,414	773	32.02	0.278	0.372
2008	1116	43	3.85	0.08	1.51	394	41	10.41	0.16	1.42	2,244	747	33.29	0.449	0.585
<b>All Yr.</b>	<b>4006</b>	<b>339</b>	<b>8.46</b>	<b>0.10</b>	<b>0.65</b>	<b>1231</b>	<b>199</b>	<b>16.17</b>	<b>0.13</b>	<b>0.90</b>	<b>4,006</b>	<b>1512</b>	<b>37.74</b>	<b>0.358</b>	<b>0.508</b>

Source: Pradhan, 2010

From Table 2.6, it is apparent that Indian manufacturing firms has very low incident of incurring in-house R and D and the intensity of such activities is very weak. For instance, average percent of R and D expenses on large firms was about 38 percent during year 1991-2008. This share slides to 16.17 per cent and 8.46 per cent for medium firms and small firms respectively. In small firms the R and D performance has very poor and large number of small firms not doing R and D, the overall intensity of all small firms is very small at 0.1 per cent. As compared to small firms, medium firms have relatively better incidence of undertaking in-house R and D. R and D intensity of medium firms as continued to be below 0.2 per cent in the overall period and it has gradually declined. In contrast, large firms' R and D intensity has generally been increased over 1991–2008. As a corollary from graph shown in Figure 2.2, MSMEs substantially lagged behind large firms in terms of allocating resources for R and D relative to sales, nevertheless R and D doing MSMEs are way ahead in R and D intensity than R and D doing large firms. The liberalization of economic policies in the last two decades and intensifying market competition tends to be a cause of policy concern for the survival of MSMEs in emerging economies like India as these firms accounts for the largest chunk of industrial units and employment. Given their limited financial and intangible resources, the promotion of R and D among MSMEs has become a very important policy parameter. The study report show that Indian MSMEs have lowest incidence of doing in-house R and D and their R and D intensities have fallen in the last decade (Pradhan, 2010).

It is also observed that the magnitude of R and D intensity of MSMEs has gone down in 2000s as compared to 1990s. This is in contrast to a rising R and D investment trend from large firms in these years. The low and declining MSMEs R and D intensity seems to suggest that small firms are falling behind in up-gradation of technological capabilities than their large counterparts that are consistently pushing up their R and D investments. The discouraging R and D performance of MSMEs in the last two decade underscore an uneven technological development that is taking place across firm size within Indian manufacturing sector. While large firms are increasing their R and D involvement over years, MSMEs remain the most vulnerable section of enterprise with least probability of incurring R and D.

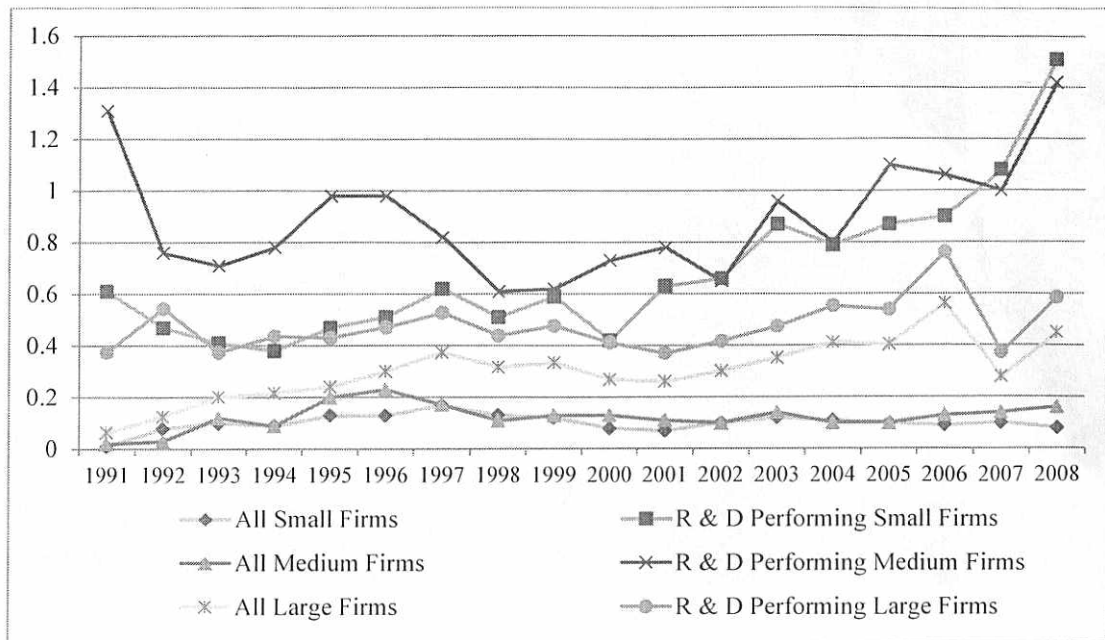


Figure 2.2: R and D Intensity of Indian Manufacturing Firms, 1991-2008 (in %)

Source: Pradhan, 2010

## 2.5 QM: Philosophy of Change

The core philosophy of QM as it is understood today is that each step in a production process is seen as a relationship between a customer and a supplier (whether internal or external to the organization). The suppliers will have to meet the customer's requirements, both stated and implied, at the lowest cost. Waste elimination and continuous improvement are ongoing activities.

The history of quality control is undoubtedly as old as industry itself. The concept of specialization of labor was introduced during the industrial revolution. As a result, a worker no longer made the entire product, only in a portion – brought about a decline in workmanship. Because most products manufactured during that early period were not complicated, quality was not greatly affected. In fact, because productivity improved there was a decrease in cost, which resulted in lower customer expectations. As products became more complicated and jobs more specialized, it became necessary to inspect after manufacture.

Traditionally, quality control/inspection was employed to convey the assurance to the buyer. In this method higher quality implied higher cost and this led to the historical trade-off between cost and quality (Deming, 1982; Cullen and Hollingum, 1987). Moreover, quality control/ inspection were not sufficiently responsive to the changing

paradigms of a technology driven market. Thus, it was realized that inspecting the product was not a satisfactory way of assuring that the product would give the desired satisfaction and performance during its life (Chase, 1989). This finally pointed to a need to bring the dynamic aspect of quality into focus by interlinking its hard, soft and human aspects.

QM emerged as a solution to this need and has been adopted enthusiastically by many successful world class businesses since the late 80s (Easton, 1997). QM differs from traditional quality improvements philosophies and process in that it is a company-wide initiative involving everyone in the organization. Typically, QM's scope covers all the functions within an organization from design, production, sales, marketing, and service (Okland, 1992). In brief, QM represents a new management paradigm that suits the fast changing economic trade and investment environment.

In the early 1950's the term total quality control (TQC) was coined by A.V. Feigenbaum. He define TQC is an effective system for integrating the quality development, quality maintenance and quality improvement efforts of the various functions of business to enable production and service at the most economical level to meet full customer satisfaction. He developed the concept that quality in manufacturing could not be achieved if the products were poorly designed, inefficiently distributed, incorrectly marketed and improperly supported in the customer's site. He also develops the concept of cost of quality (COQ) in order to quantify the benefits of adopting a QM (Feigenbaum, 1991). Shewchart emphasized the need to understand work processing using statistical tools (Quazi et al., 1998). Deming (1986) recommended fourteen points for managing quality in an organization. Juran (1993) identified three fundamental managerial processes called Juran Triology (i.e. quality planning, quality improvement, and quality control) for managing quality. Crosby (1980) prescribed the steps to zero defects as well as the price of nonconformance. Ishikawa was the first person to use the phrase companywide quality control (CWQC). He advocate use of problem solving tools such as cause and effect diagram, quality circle and also demonstrated the use of seven quality control (QC) tools (Berry, 1991). Sink (1991) emphasizes on "Collective Ownership" and "Common Concern" as prerequisites of QM. Zairi (2002) identified process flexibility, workplace design, user supply chain, management control system as the pillars on which QM system is build. Okland (1992) stresses on customer focus, management

commitment, total participation, statistical quality control and systematic problem solving focus as the important factors for implementing QM.

The early development of QM was influenced by a few quality 'gurus': Shewhart, Deming, Juran, Feigenbaum, Crosby, Ishikawa and Taguchi. Their studied contributions are recognized existed in all manufacturing processes.

QM combines culture-changing approach with structured techniques, whose focus is on satisfying the needs of internal customers and hence external customers. Numerous report of successful QM implementation in a variety of organizations has appeared in management literature (Youssef et al., 1996; Easton, 1997). Essentially, the reports highlight the increased number of error free process that delivered products and services fit for use, on time, with competitive pricing and good value. When properly carried out, QM was seen to integrate well into all aspect of the corporate identify (Pike and Barnes, 1994).

QM works better in the manufacturing sector than in service sector (Boyne and Walker, 2002). The implementation of QM has not been an easy task for many organizations (Yusof and Aspinwall, 2000). According to Umesh et al., (2000) the success rate of QM implementation has been around 25% to 30, while Tata and Prasad (1998) have reported that about half of organizations have experienced improvements through QM. It has been said that the QM model provides a self-assessment protocol outlining the criteria for business excellence, but without solid guidance on 'how' to achieve it (Chan et al., 2002). The Tata and Prasad (1998) also suggested that QM implementation is influenced by the cultural and structural variables and insufficient attention on these variables influenced failure of QM implementation. However, others have considered QM as a 'long term journey with substantial hardship at the beginning which Juran calls sporadic spikes' (Noronha 2002). Noronha further says that this positive view towards uncertainty provides the basis for a healthy attitude towards QM.

At a more ideological level, QM has been dismissed as a managerial control mechanism loosely disguised as a method of worker empowerment. Another criticism of QM has been that it provides a rhetoric that is individually interpreted and therefore carries inconsistent meaning across contexts (Reed et al., 2002).

Cao et al., (2000) contend that for QM to be successful, an approach which addresses in process, functions (structural changes), values (cultural changes) and in power within the organization is required. However, since QM as an approach, focuses almost entirely on

the changes in process, a systemic approach is needed for successful implementation of QM or its application needs to be restricted to those contexts where process dominates (Cao et al., 2000). Thus, Cao, Clarke and Lehany concluded that the success of QM programs is in sharp contrast to its popularity.

In view of this criticism and given the multi attribute characteristics of QM as emphasized by the founding fathers of QM and a question arises that what are the different parameters or organizational attributes which are required for an effective implementation of QM as it is understood today.

The basic two approaches have been used by different researchers to answer this question.

The approaches are:

- i. Understanding the Critical Success Factors (CSF) of QM
- ii. QM as understood from different quality award models.

The basic thrust of this research work is to implementation of QM in MSMEs in Indian context. Thus understanding the parameters which account for the success or failure of QM implementation will be useful for this research.

## **2.6 Critical Success Factors for QM**

This approach was used to assess the organizational requirements for successful implementation of QM is through the identification of CSF. In an attempt to establish empirically validated factors that influence successful implementation of QM.

Saraph et al., (1989) proposed measures of overall organizational quality management for both manufacturing and service firms. This appears to be a systematic attempt to organize and synthesize the various sets of critical factors identified by different quality gurus. From the literature Saraph et al., (1989) identified 120 organizational requirements (prescriptions) or effective quality management. Through a judgmental process of grouping similar requirements, these prescriptions were grouped into eight separate categories. These eight categories reflected the prescription of all or nearly all of the quality gurus.

The study subsequently paved the way for several other empirical studies to be connected using the instrument developed in the study (Quazi et al., 1998; Engelkemeyer, 1991; Baker and Starbird, 1992; Boltz, 1992; Ramirez and Loney, 1993; Black, 1993; Motwani et al., 1994; Badri and Davis, 1995; Mohanty, 1997).

Baker and Starbird, (1992) used the Saraph et al.'s instrument to evaluate the extent to which the factors critical to effective quality management are present among California food processors. The study empirically confirmed the importance placed on the role of top management and their behavior and the quality policy in the pursuit of policy management. The result of study also indicates that compared to a centralized approach, companywide sharing of responsibility for quality is generally more conducive to the pursuit of quality management. Boltes (1992) attempted to duplicate Saraph et al.'s study in the cooperative extension system. The study involved the identification of the critical factor for effective quality management and the use of instrument to identify organizational training needs. The study of finding of earlier studies is seven critical factors were identified.

- Administrative support for strategic quality
- Strategic quality planning
- Continuous quality improvement
- Strategic human resources management
- Quality information and analysis
- Clients satisfaction
- Quality in education and training

Motwani et al., (1994) used Saraph et al.'s instrument in their study of quality management practices in Indian organizations. The study, provided the opportunity to test the reliability and validity of the instrument in an internationally environment. The study involved interpretation of data to correlate the critical factors and the quality performance of the companies. The study produced a few conclusions contradictory to widely accepted knowledge, notably that top management direct commitment and hands on involvement are not essential for effective quality performance.

The researches replicated Saraph et al.'s study and identified ten factors which affect successful implementation of QM (Black, 1993; Black and Porter, 1996).

- People and customer management
- Supplier management
- Communication of improvement information
- Customer satisfaction orientation
- External interface management



- Strategic quality management
- Teamwork structures for process improvement
- Operational quality planning
- Quality improvement measurement system
- Corporate quality culture

Other replicate studies were conducted in India (Mohanty, 1997) and United Arab Emirates (Badri and Davis, 1995). Table 2.9 shows the critical factors in quality management that were identified by Saraph et al., (1989).

An early exploratory attempt to arrive at CSF in Indian context was made by Motwani et al., (1994) wherein they arrived at nine critical factors for effective management of quality in Indian manufacturing industry. As the QM literature in India moved from introductory level discussion on QM (Lakhe and Mohanty, 1994) to more robust research work, the emphasis also shifted from a mere duplicating of western models of quality to trying to develop indigenous models. Wali et al., (2003) made a review of various CSF which different authors including the founding fathers of QM like Deming, Juran, Ishikawa, Crosby, Feigenbaum, and Garvin had recommended. Wali et al., started from the early work of identification of the CSF by Saraph, Benson and Schroeder (1989), Ahire, Golhar and Waller (1996). From there, they attempted to identify the CSF for adoption of QM in Indian context. Their study claims that these CSFs are derived based on actual practices followed by Indian organizations and it was based on a statistically validated instrument and factor analysis.

In the light of these findings, the awards can be generally accepted as QM framework or as a good starting point for any industry specific initiatives in that direction.

## **2.7 Different International Quality Awards**

The third approach towards the understanding of QM is through different quality awards. As QM became popular around the world, the concepts of QM were embodied in various national quality awards (NQA). Thus a comparison of different quality awards can provide insight into the similarities and differences in the understanding of QM across the world.

Bauer et al., (2000) have said that these quality awards are today looked upon as models of excellence. The basis for considering a quality award framework as a model of

business excellence is that now it usually contains a set of quality criteria that encompass all areas of an organization's operation.

Table 2.9: Critical Factors in Quality Management

Critical Factor	Explanation of Critical factor
Management leadership and quality policy	Acceptance of quality responsibility by general manager and department heads. Evaluation of top management on quality. Participation by top management efforts. Specificity of quality goals. Importance attached to quality in relation to cost and schedule. Comprehensive quality planning.
Role of quality department	Visibility and autonomy of quality department. The quality department's access to top management. Use of quality staff for consolation. Coordination between departments and other departments. Effectiveness of the quality department.
Training	Provision of statistical training and quality related training for all employees.
Product/ Service design	Through scrub down process. Involvement of all affected departments in design reviews. Emphasis on quality, not rollout schedules. Avoidance of frequent redesigns.
Supplier quality management	Fewer, dependable suppliers. Reliance on supplier process control. Strong interdependence of supplier and customer. Purchasing policy emphasizing quality rather than price. Supplier quality control. Supplier assistance in product development.
Process management	Clarity of process ownership, boundaries and steps. Less reliance on inspection. Use of SPC. Selective automation. Foolproof process design. Preventive maintenance. Employee self inspection. Automated testing.
Quality data and reporting	Use of quality cost data. Feedback of quality data to employees and managers for problem solving. Timely quality measurement. Evaluation of manager and employees based on quality performance. Availability of quality data.
Employee relations	Implementation of employee involvement and quality circles. Open employee participation in quality decisions. Responsibility of employees for quality. Employee's reorganization for superior quality performance. Effective of supervision in handling quality issues. Ongoing quality awareness of all employees.

Source: Saraph et al., 1989

## 2.8 History of Quality Awards

The Deming Prize (DP) is the oldest quality award instituted in 1951 by the Union of Japanese Scientists and Engineers (JUSE). It is awarded to both individuals and groups that have made significant contributions to QC research and to companies that have excelled in applying QC programs. When the QM concept was brought to the United State (US), the MBNQA was established in 1987. It is awarded in the categories of manufacturing, small business and service. In 1991, the EQA was instituted for European companies, almost on the same lines as the Baldrige award. In 1992, the Australian Quality Award (AQA) was instituted. Since these are the earlier awards, a comparative analysis of them is now set out.

Vokurka et al., (2000) have compared the MBNQA, EQA, DP, AQA and Canadian Quality Award (CQA) on the basis of their objectives, quality principles and criteria. The comparison of commonalities among different quality awards shows in Table 2.10. The commonality is that they all use a minimum of seven criteria are-

- i. Leadership
- ii. Strategic planning
- iii. Customer and market focus
- iv. Information and analysis
- v. Human resource focus
- vi. Process management
- vii. Business results.

They all emphasize customer driven quality control through streamlining processes, product design, leadership, human resource development and customer focused strategic plans. In all the models, customer satisfaction, employee satisfaction and community satisfaction are emphasized. However the criteria differ on what they *understand* by the seven quality areas – leadership, planning, customers, suppliers, employees, processes and results. Table 2.11 shows seven commonly identified criteria of various quality awards model. A comparison of these quality criteria shows that except for DP, all other award models have common factors. They all assign considerable weightage to the results. So, the result is a dependent variable and the enablers are the independent variables.

Table 2.10: Comparison between the Objectives, Quality Principles and Criteria of Different Quality Awards

	MBNQA	EQA	DP	CQA	AQA
<b>Objective</b>	<ul style="list-style-type: none"> <li>To help improve performance practices and capabilities</li> <li>To facilitate communication and sharing of best practices among US organizations.</li> <li>To serve as a working tool for understanding and managing performance, planning, training and assessment.</li> </ul>	<ul style="list-style-type: none"> <li>To stimulate and assist European organizations in improving customer and employee satisfaction, impact on society and business results.</li> <li>To support Europe managers' efforts to initiate total quality management and achieve global competitive advantage.</li> </ul>	<ul style="list-style-type: none"> <li>To evaluate and recognize methods of companywide quality control.</li> </ul>	<ul style="list-style-type: none"> <li>To encourage the adoption of quality principles, practices and processes in Canada.</li> <li>To improve the profitability responsiveness and efficiency of organizations through continuous improvement.</li> <li>To bring higher living standards to Canadians</li> </ul>	<ul style="list-style-type: none"> <li>To give Australian organizations the drive and knowledge for achieving the world's best quality practices.</li> <li>To secure the Australian quality council as the commonwealth's principal quality organization.</li> <li>To create national wealth.</li> </ul>
<b>Quality principles</b>	<ul style="list-style-type: none"> <li>Companies must have direction and customer focus.</li> <li>Quality and performance are judged by customers.</li> <li>Organizational and personal learning are required.</li> <li>Employees and partners are vital to company success.</li> <li>Success requires capacity for change and flexibility.</li> <li>Market leadership requires a future orientation.</li> <li>Making meaningful change requires innovation.</li> <li>Mgmt requires factual analysis.</li> <li>Public responsibility is important.</li> <li>Performance measurement should focus on results.</li> </ul>	<ul style="list-style-type: none"> <li>Customer focus.</li> <li>Supplier partnership.</li> <li>People development and involvement</li> <li>Processes and facts.</li> <li>Continuous improvement and innovation.</li> <li>Leadership and consistency of purpose.</li> <li>Public responsibility</li> <li>Result orientation.</li> </ul>	<ul style="list-style-type: none"> <li>Create a vision and demonstrate commitment.</li> <li>Learn the new philosophy.</li> <li>Understand inspection.</li> <li>Stop making decisions purely on the basis of cost.</li> <li>Improve constantly and forever.</li> <li>Institute training.</li> <li>Institute leadership.</li> <li>Drive out fear.</li> <li>Optimize the efforts of team.</li> <li>Eliminate exhortations</li> <li>Eliminate numerical quotas and management by objective.</li> <li>Remove barriers to pride in workmanship.</li> <li>Encourage education and self improvement and Take action</li> </ul>	<ul style="list-style-type: none"> <li>Cooperation + team + partnering = win-win.</li> <li>Leadership = involvement + example.</li> <li>Primary focus = customer.</li> <li>Respect and encouragement heighten employee potential.</li> <li>Strategies should be process oriented &amp; prevention based.</li> <li>Companies should continuously improve methods and outcomes.</li> <li>Decisions should be made based on factual data or information.</li> <li>Companies are obligated to stakeholders and society in general.</li> </ul>	<ul style="list-style-type: none"> <li>The customer defines quality.</li> <li>All processes are variable.</li> <li>Improved process = improved output.</li> <li>Decisions should depend on facts.</li> <li>Improvement should be planned.</li> <li>People work in a system.</li> <li>People = most important resource.</li> <li>Leadership = direction + support.</li> <li>Continuous improvement requires continual learning.</li> </ul>
<b>Criteria</b>	<ol style="list-style-type: none"> <li>Leadership</li> <li>Strategic planning</li> <li>Customer and market focus</li> <li>Information and analysis</li> <li>Human resource focus</li> <li>Process management</li> <li>Business results</li> </ol>	<ol style="list-style-type: none"> <li>Leadership</li> <li>Policy and strategy</li> <li>People management</li> <li>Resources</li> <li>Processes</li> <li>Customer satisfaction</li> <li>People satisfaction</li> <li>Impact on society</li> <li>Business results</li> </ol>	<ol style="list-style-type: none"> <li>Policies (hoshin)</li> <li>Organization</li> <li>Information</li> <li>Standardization</li> <li>Human resources</li> <li>Quality assurance</li> <li>Maintenance</li> <li>Improvement</li> <li>Effects &amp; 10. Future plans</li> </ol>	<ol style="list-style-type: none"> <li>Leadership</li> <li>Planning</li> <li>Customer focus</li> <li>People focus</li> <li>Process management</li> <li>Supplier focus</li> <li>Organizational performance</li> </ol>	<ol style="list-style-type: none"> <li>Leadership</li> <li>Strategy, policy and planning</li> <li>Information and analysis</li> <li>People</li> <li>Customer focus</li> <li>Quality of process, product and service</li> <li>Organizational performance</li> </ol>

Source: Vokurka, Stading and Brazeal, 2000

Table 2.11: Understanding of the Seven Criteria in Different Quality Awards

	Malcolm Baldrige Award (US)	European Quality Award	Deming Prize (Japan)	Canadian Quality Award	Australian Quality Award
<b>Leadership</b>	Executive, company and community leadership	Inspiration, support and promotion of total quality management	Policy, organization and Helpful supervision	Strategic direction, involvement and improvement	Executive, community and strategic process
<b>Planning</b>	Strategic direction, plan development, plan deployment and performance tracking	Product of policy and strategy	Future plans, quality control initiative and policy focus	Development, assessment, deployment and improvement	Policy, value integration and strategic process
<b>Customers</b>	Market requirements, customer relationships and satisfaction	Measurement of customer satisfaction	Service activities and customer relationships	Knowing customer needs, relationship management, customer satisfaction and improvement	Customer need awareness, relationships and satisfaction
<b>Employees</b>	Human resource development and participatory environment	Release of full potential through people management	Training and motivation of skilled labour personnel	Human resource planning, participation, learning and improvement	People mgt., involvement, training, communication & satisfaction
<b>Processes</b>	Process design, implementation, management and improvement	Identification, management, review and improvement	Standardization, quality assurance, maintenance and improvement	Design, control, analysis and change, and improvement	Quality of product design and services, supplier relationships and improvement
<b>Suppliers</b>	Improvement of partnering process and evaluation of supplier performance	Leadership involvement with and management of supplier resource	Vendor training and associations of related companies	Partnership, supplier quality and improvement	Quality of relationships
<b>Results</b>	Customer, financial, human resource, supplier, operational and competitive	Objective achievement, stakeholder satisfaction, financial success and impact on society	Quality, delivery, cost, profit, safety and environmental effects of quality control	Product, operational, customer, employee and financial	Organizational performance with customers, shareholders, employees and community

Source: Vokurka, Stading and Brazeal, 2000

Table 2.12: Summary of National Quality Award Criteria

<b>South African Excellence Award (2000)</b>	<b>Japan Quality Award (2000)</b>
Leadership Policy & Strategy Customer & Market Focus People Management Resources & Information Management Processes Impact on Society Customer Satisfaction People Satisfaction Supplier and Partnership Performance Business Results	Management Vision and Leadership Understanding and Interaction With Customers And Market Strategic Planning and Deployment Human Resource Development and Learning Environment Process Management Sharing and Utilization of Information Results of Enterprise Activities Customer Satisfaction
<b>European Quality Award (2001)</b>	<b>CII_EXIM Business Excellence Award (India)- CEBEA (2002)</b>
Leadership Policy and Strategy People Partnership and Resources Processes Customer Results People Results Society Results Key Performance Results	Leadership Policies and strategies People management Resources Processes People satisfaction Customer satisfaction Impact on society Business results
<b>U.S. Malcolm Baldrige National Quality Award (2001/2)</b>	<b>Australian Business Excellence Award (2000)</b>
Leadership Strategic Planning Customer and Market Focus Information and Analysis Human Resource Focus Process Management Business Results	Leadership and Innovation Strategy and Planning Process Data, Information and Knowledge People Customer and Market Focus Processes, Products and Services Business Results
<b>Canadian Award for Excellence (2000)</b>	<b>Costa Rica Excellence Award (2000)</b>
Leadership Planning Customer Focus People Focus Process Management Partner/Supplier Focus Organizational/Business Performance	Customer Satisfaction Managerial Leadership and Strategic Planning Human Resources Quality System and Processes Innovation and Technology Environment Management
<b>Singapore Quality Award (2001)</b>	<b>Jordan: King Abdullah II Award for Excellence (2000)</b>
Leadership Planning Information People Processes Customers & Results	Leadership Strategic Planning Process Management Resource Management Results
Source: Hui and Chuan, 2002	

Over time other countries, notably from the non-developed and developing belt, also instituted NQA. The commonalities and differences among quality awards of both developed and developing countries are compared with the early quality awards viz. DP, MBNQA and EQA. Hui and Chuan (2002) made a comparison of the NQA of nine countries. Their criteria are indicated in Table 2.12. The CII\_EXIM award of India is also shown for the sake of quick comparison.

It is noteworthy that all the criteria in Table 2.12 can be grouped into two classes of enablers and results. This is perhaps a pointer to certain consistency in the selection of criteria of quality awards by different countries.

The literature review till now focused on the development of QM in Eastern and western countries. An attempt was then made to understand QM through the lens of QM awards. Now it is very important to see the comparison of Indian quality awards with MBNQA and EQA.

## **2.9 Indian Quality Awards vs. MBNQA, EQA**

The literature review, till now, shows that in the western literature, QM has been an important field of study for the last two to three decades. In Indian context however, the QM initiative was first set up by the Confederation of Indian Industry (CII) in the early 1980s. In 1987 and 1988, the CII invited the Juran Institute to India to conduct workshops and in 1989 a team from India attended the Deming seminar in London.

Because of the strategic tie-up between many Japanese automobile manufacturers and Indian automobile manufacturers, there have been QM implementations in some Indian automobile companies such as Maruti and TVS Suzuki. Jagadeesh (1999) reported that, in general, the manufacturing sector in India is well aware of the importance of quality. Also, there are large variations in the depth and the spread of quality culture among Indian organizations. Some are comparable to the best in the world, but the bulk of Indian companies are yet to make use of the various techniques for continuous improvement.

As the concept of quality began to be internalized by Indian industry, spurred to a great extent by competition, quality awards were instituted on the lines of MBNQA and EQA. The MBNQA was introduced in 1987, and the EQA was introduced in 1991. In comparison, the first Indian quality award RGNQA was instituted in 1991. Thereafter a number of quality awards were also announced. This was a measure of the maturing of quality related concepts in India. In Table 2.13, different Indian quality awards and their

criteria have been compared. It is seen from the table that all the four Indian awards have given almost the same weight-age to different quality criteria. It is thus noted that in the Indian quality awards also, QM is considered as the equivalent to business excellence.

When these quality awards were instituted, they were generally based on western quality models of MBNQA and EQA (Chandra and Adur, 1999). Even now, the comparison of Indian quality awards with MBNQA and EQA show that there are striking similarities among the 'enablers' and the 'results' of the Indian quality awards vis-à-vis the corresponding enablers and results of the western quality awards. The relative weight-age given by Indian quality awards on different criteria are also similar to those given by EQA and MBNQA as shown in Table 2.13.

The researcher believes that the aspects mentioned above can be called the soft side of an organization and use of QM has reported by large-scale industries. However, very few studies have been found in MSMEs.

In spite of success stories of QM, still the concept has not been really adopted by MSMEs (Dale and Duncalf, 1984). The main reason for low use of QM in MSMEs are, cost constraints, lack of sources and information on QM, specially oriented to MSMEs and lower level of awareness and understanding (Wilkson, 1994; Taylor, 1996).

The literature shows that MSMEs are using different approaches to achieve QM. One most commonly used approach is ISO 9000 series registration (Motwani et al., 1994; Maheshwari and Zhao, 1994; TQM Centre, 1996; Sharma, 1997). This certification is act as a bridge between the traditional management of MSMEs and a more sophisticated one. It plays a catalytic role in the adoption of new management tools. For continuous improvement, it is essential to evaluate the organization according to award model. The values of self- assessment and continuous improvement is not fully appreciated by MSMEs (Hewitt, 1996)

Researchers (Hewitt, 1996; Wilkes and Dale, 1998; Kaye and Dyason, 1999) have found that the contemporary quality award models (MBNQA and EFQM) are not ideal for MSMEs in the present form. Some of the short comings with the award models of today are-

- They are too extensive for the reality of small organizations.
- The models provide a good framework for QM in large scale industries, but take no accounts of the need of small organizations.



- The models are often written in large company language and not with the small business in mind.

Table 2.13: Major Indian National Quality Awards Vs MBNQA and EQA

Percentage Emphasis of Quality Award Model													
Organizations		International				Indian							
		European Foundation for Quality Management		US Deptt. of Commerce, Tech. Administration-on, NIST, Gaithersburg, MD		Bureau of Indian Standards, New Delhi		Institute of Directors, New Delhi		Confederation of Indian Industry and Export Import Bank of India, New Delhi		Indian Merchant's Chamber Bombay	
Criteria		EQA		MBNQA		RGNQA		GPNQA		CII-EXIM		IMC-RBA	
		Point		Point		Point		Point		Point		Point	
Enablers	Leadership/	100	10	110	11	100	10	120	12	100	10	100	10
	Organization leadership												
	Strategic Planning/	80	8	80	8	80	8	80	8	80	8	80	8
	Policies and strategy												
	HRM/HRDM/	90	9	100	10	90	9	100	10	90	9	100	10
	People management												
	Information analysis	-	-	80	8	-	-	80	8	-	-	80	8
	Process management	140	14	100	10	140	14	120	12	140	14	140	14
	/ Process												
	Resources	90	9	-	-	90	9	-	-	90	9	-	-
	Customer market	-	-	80	8	-	-	-	-	-	-	-	-
	focus/ Customer focus												
Sub Total	500	50	550	55	500	50	500	50	500	50	500	50	
Results	Customer satisfaction	200	20	-	-	200	20	150	15	200	20	100	10
	People satisfaction	90	9	-	-	-	-	-	-	90	9	-	-
	Employee satisfaction	-	-	-	-	90	9	100	10	-	-	-	-
	Business Result	150	15	450	45	150	15	150	15	150	15	400	40
	Impact on society	60	6		-	60	6	100	10	60	6	-	-
	Sub Total	500	50	450	45	500	50	500	50	500	50	500	50
<b>Total</b>	K	H	K	H	K	H	K	H	K	H	K	H	
Note: K=1000,H=100													
Source: Kumar, 2005													

The literature review till now focused on the development of QM in large scale industries. An attempt was then made to understand QM through the lens of QM awards. The Saunder and Preston (S-P) models of quality awards are reviewed for the implementation QM in MSMEs.

This model consists of several components, which represents the attributes and activities of an organization that is successfully implementing the QM. The components of the model are team processes, internal customer focus, use of data, common understanding of quality, quality improvements, understanding of processes, supplier partnership, understanding of customer needs, ability to control and improve processes and products, reduced waste, less variation, better quality. This model of QM overcomes some of the existing problems in the study of QM. It provides a basis for determining how widely QM is applicable and can also be used to identify the aspects of the environment required for successful implementation of QM. This model consists of several components, which represent the attributes and activities of an organization that is successfully implementing the QM approach.

Considering the versatility of Saunder and Preston's model, study of various components of this model and identifying the criteria's and quantifiable indicators for measuring its components is needed for developing a multi-attributes decision model which may help for successful implementation of QM components in MSMEs in Indian context. The limitations of this model are that it cannot identify the degree to which the various components of the QM are present in the organization.

## **2.10 AHP and QM**

AHP is a new paradigm of measurement that has numerous practical implications because it makes it possible for to deal with intangible factors alongside tangibles used in science and mathematics in a realistic and justifiable way. The Analytical hierarchy process is a powerful tool in applying multi criteria decision analysis (MCDA) was created by Thomas Saaty. In AHP method, obtaining the weights or priority vector of the alternatives or the criteria is required. For this purpose Saaty, (1980) has used and developed the PCM.

AHP is used for many different purposes and one very common point of use for it is implementation of QM in MSMEs. AHP should be one of the most valid approaches to help those MSMEs to make their decisions when choosing their QM factor. Decision

makers of the company can then select the right QM factor to fit their business processes and strategy.

Lewis has investigated in their research that the benefit of QM are achieved in MSMEs by AHP methodology. One can identify the strength and weakness, after determining the percent weightage of categories of performance criteria (Lewis et al., 2005). Chan and Kumar (2007) have identified supplier selection criterion by using AHP method. Chin investigates the critical factors and sub factors that determines the implementation of QM in the Shanghai manufacturing industries. It incorporates the main finding of recent study, in which an AHP approach was employed to prioritize the relative importance of four critical factors and sixteen sub factors among industries (Chin et al., 2002). Chan and Lynn (1991) used AHP to propose model for evaluation of several branches of a firm. AHP has been well used for personnel selection (Taylor III et al., 1998), employee performance evolution and appraisal (Islam and Rasad, 2005), comparing overall performance of different manufacturing departments of company (Rangone, 1996). The application AHP has been found in MSMEs for implementation of WCM (World Class Manufacturing) factor, QM factor to achieving benefits (Lewis et al., 2005; Ramoutar and Syan, 2009). AHP is a decision support tool which can be used to solve complex decision problems (Triantaphyllou and Mann, 1995).

AHP was used by IBM as part of its quality improvement strategy and win the prestigious MBNQ Award (Bauer et al., 1992). Xerox Corporation has used the AHP to allocate close to a billion dollars to its research projects. In 1999, the Ford Motor Company used the AHP to establish priorities for criteria that improve customer satisfaction. AHP has been used in China dozens of times to determine sights for building dams and other engineering applications (Saaty, 2008 a). Some of the industrial engineering applications of the AHP include its use in integrated manufacturing, in the evolution of technology investment decisions, in flexible manufacturing system, layout design (Triantaphyllou and Mann, 1995).

As a conclusion, it uses multi level hierarchical structure of objectives, criteria, sub-criteria and alternatives. The pertinent data are derived by using a set of pair-wise comparisons. These comparisons are used to obtain the weights of importance of the decision criteria, and the relative performance measures of the alternatives in terms of each individual decision criteria. If the comparisons are not perfectly consistent, then it provides a mechanism for improving consistency.

## 2.11 Gap in Existing Literature

In brief, literature review shows that the importance of QM for managing quality has been recognized by large scale industries, worldwide. Some are using QM as an effective tool for continuous improvement. It is also observed that the industries, which have implemented QM, are enjoying the benefits out of it. The various approaches are being used to achieve QM. Literature also shows that the various QM implementation models are developed by researchers but there are no such things as 'one fit all' model. All these models are of descriptive type and for the purpose of researching the value of QM, they are limited use.

The prominent reason is the non-availability of QM implementation model with weightage system of its components. So it is imperative to pay attention towards implementation of QM model considering the weightage system of the components. So it is essential to develop a new 'QM Model' for MSMEs which can overcome the limitation of the above models and facilitate the use of QM in MSMEs.

Based on the literature survey the following gaps are identified-

- Even though models for QM implementation are available, there is hardly any model for MSMEs which tries to quantify the effort required and the benefit achieved through quality management.
- In Indian context, there is very few reported study especially for MSMEs.
- Though studies are carried out for finding reason for sickness of MSMEs, there is no concentrated effort to study quality related problems.
- As already stated, MSMEs contribute significantly to the economy, however their linkage with large scale industries are not investigated in detail especially in Indian context.

Hence, it appears that studying MSMEs from a quality perspective would provide a challenge to both academician and practitioners.

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## CHAPTER 3: Research Methodology

The gaps identified in literature review gave rise to the research project objective. Introduction of suitable research methods for data collection and analysis is very important to achieve good scientific quality results in the research. This chapter dealt with research methodology, sample design and data source.

It has been suggested that to get broader insights into the issues being investigated the researcher should try to mix research methods. Accordingly in this research also, instead of following a particular approach, both qualitative and quantitative approaches have been used dictated by the needs of the situation. The initial step of the project is to identify the target segment of the study and as per the guideline the selected target segment is Nashik district from Maharashtra state, India

### 3.1 Sampling Design and Data Sources

Maharashtra is the second largest State in India in terms of population and 3<sup>rd</sup> largest as per geographical area (3.08 lakh sq.km) of the country. The state has actual population of 112,373,972 (as per 2011 Census (Provisional) which is 9.29 percent share of total population of India. The State has 35 districts which are divided into six revenue divisions viz. Konkan, Pune, Nashik, Aurangabad, Amravati and Nagpur.

For this project the target population is restricted for Nashik district only. Nashik district, located in North West Maharashtra, is one of the fastest developing regions of the state. The total area of Nashik district is 15,530 sq. kms.

Nashik district is famous for its historical and religious significance. Godavari, one of the most prominent rivers, originates from the holy place Trimbakeshwar. Some of the prominent institutions in Nashik include India Security Press (ISP), Currency Note Press (CNP), Ministry of Defence's Fighter Plane (MIG) Production Unit HAL (Hindustan Aeronautics Limited), Artillery Centre at Deolali, Maharashtra Engineering Research Institute (MERI), Maharashtra State Health University, Yashwantrao Chavan Maharashtra Open University (YCMOU), and Maharashtra Police Academy (MPA), among others.

**a. MSMEs Scenario of Nashik District:** The turnover of MSMEs for FY12 from Nashik district stood at Rs. 14,527.6 mn. Exports account for ~5% of the turnover. As on July 2012, on a cumulative basis, there were a total of 14,592 MSMEs in Nashik district, with

58% operating in the manufacturing sector and the remaining 42% providing different types of services. Micro sized enterprises account for around 64% share of total enterprises, followed by 63% share of small sized companies. Medium sized companies account for less than 1% of the total enterprises. Total employment in MSMEs of Nashik district stood at 113,688. Micro sized companies account for 53% of employment generation, followed by small sized companies 43%. 72% of the people are employed in the manufacturing sector ([www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf](http://www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf)). Table 3.1 shows the Details of Micro, Small and Medium Enterprises in Nashik district.

Table 3.1: Details of Micro, Small and Medium Enterprises in Nashik district

Cumulative figures up to July 2012				
Category	Number of Enterprises	Employment	Investment in plant and machinery (Rs. mn)	Production capacity (Rs. mn)
Micro	9,331	60,321	10,944.9	181,309.7
Small	5,228	49,452	19,757.6	241,544.4
Medium	33	3,915	2,071.0	4,286.4
Total	14,592	113,688	32,773.5	427,140.5
Source: MSME – Development Institute, Mumbai, Ministry of MSME, Government of India; DIC, Nashik <Retrieved From <a href="https://www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf">https://www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf</a> >				

The Micro, Small and Medium Enterprises in Nashik district are working in various sectors. The sector-wise details of existing MSMEs of Nashik District are given in Table 3.2.

**b. Prominent Clusters of Nashik District:** Some of the prominent clusters in Nashik district include Paithani saree, winery, raisin making, silver ornaments, textile, and engineering, among others. There is scope for various other industries such as agro-based products, fruit processing, forest-based products, and animal-based products, among others.

**Sample Design:** This study mainly covers the MSMEs in manufacturing sector which covers the Manufacture of Machinery & Equipment, Manufacture of Fabricated Metal Products, Manufacture of Electrical, and Machinery & Apparatus. From Table 3.1, it is observed that the total no of MSMEs in Nashik region are 14,592. The initial step of project is to select the sample size from given population.

The sample size is identified for 95% confidence level and  $\pm 5\%$  margin of error. From Table 3.3 the sample size is 375 for population 15,000 units.

Table 3.2: Sector-wise Details of Existing Micro & Small Enterprises and Artisan units  
Nashik district

<b>Industry</b>	<b>No. of Enterprises</b>	<b>Employment</b>
Manufacture of Food products and Beverages	712	10,807
Manufacture of Textile	889	6,606
Manufacture of Chemicals & Chemical products	821	8,208
Manufacture of Rubber & Plastic Products	923	6,687
Manufacture of Other Non-Metallic mineral products	843	4,261
Manufacture of Basic Metals	58	1,488
Manufacture of Fabricated Metal Products, Except Machinery & Equip.	1,312	12,553
Manufacture of Machinery & Equipment	941	11,243
Manufacture of Electrical, Machinery & Apparatus NEC	459	7,026
Manufacture of Furniture;	420	2,412
Computer & related activities	520	2,976
*Others	6,694	39,421
<b>Total</b>	<b>14,592</b>	<b>113,688</b>
*Others include manufacturers of products related to tobacco, paper, leather, coke, transport equipment etc and services offered in areas of health and social work, recreation, cultural & sporting, maintenance & repair of motor vehicle & motorcycles etc.		
Source: MSME – Development Institute, Mumbai, Ministry of MSME, Government of India <Retrieved From <a href="https://www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf">https://www.dnb.co.in/Nashik2013/PDF/ClusterOverview.pdf</a> >		

Table 3.3: Determining Random Sample Size from a Given Population

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Table for Determining Random Sample Size from a Given Population

(Confidence level 95%; Margin of error + or - 5%)

Population N	Sample S	N	S	N	S
10	10	220	140	1,200	291
15	14	230	144	1,300	297
20	19	240	148	1,400	302
25	24	250	152	1,500	308
30	28	260	155	1,600	310
35	32	270	159	1,700	313
40	36	280	162	1,800	317
45	40	290	165	1,900	320
50	44	300	169	2,000	322
55	48	320	175	2,200	327
60	52	340	181	2,400	331
65	56	360	186	2,600	335
70	59	380	191	2,800	338
75	63	400	196	3,000	341
80	66	420	201	3,500	346
85	70	440	205	4,000	351
90	73	460	210	4,500	354
95	76	480	214	5,000	357
100	80	500	217	6,000	361
110	86	550	226	7,000	364
120	92	600	234	8,000	367
130	97	650	242	9,000	368
140	103	700	248	10,000	370
150	108	750	254	15,000	375
160	113	800	260	20,000	377
170	118	850	265	30,000	379
180	123	900	269	40,000	380
190	127	950	274	50,000	381
200	132	1,000	278	75,000	382
210	136	1,100	285	100,000	384
				1,000,000	384
				10,000,000	384

NOTE: - Opinion surveys of the entire United States frequently consist of 1500 to 2000 interviews, to permit valid information for subgroups such as geographic regions, age, gender, and income. In a state of 3,000,000 population, surveys often involve a sample of 500 to 600, to permit breakouts.

Source: Adapted from Educational and Psychological Measurement David A Payne; Robert F McMorris 1967 English Book x, 419 p. illus. 23 cm. Waltham, Mass., Blaisdell Pub. Co.



### 3.2 Research Methodology

The survey method has used for collection of data. After identifying the target segment approved questionnaire has used to collect data from the selected sample of MSMEs. The data is collected through the three phase of questionnaire.

The objective of first part of questionnaire was to know the present status of quality management, working environment, co-relation of quality with income which decided to investigate the present status of quality system in MSMEs. It also tries to know the quality affecting parameters and variables in quality management and major barriers in the adoption of QM in MSMEs. The objective of second part of questionnaire was to know the present status of MSMEs and apply SWOT analysis for the situational analysis of MSMEs to get insights into their status. The data was collected through the questionnaire for SWOT analysis and selection grid is developed after interviewing with the experts.

The last part of questionnaire answer the question how can the attributes of QM are integrated in to a model for attaining QM practices within target MSMEs? The data was collected for to develop an instrument which could measure the progress of a unit towards the QM philosophy. The operational description of selected twelve factors which the questionnaire attempts to measure are given in Table 3.4.

The AHP tool is used for development of QM implementation model which uses and explicit the weightage system of its components by pair-wise comparison method. The paired comparison method was adopted as it is simple to administer to a generalist target group and provides reasonable confidence. The relative weights or priorities were obtained by taking the opinion of experts from the field of quality management. The experts were selected randomly without affecting their uniformity.

The AHP was applied to determine weight among various approaches for implementing QM. This process is summarized in three steps:

**Step 1: Establishing the hierarchical structure:** In general AHP uses multi level hierarchical structure of objectives, criteria, sub-criteria and alternatives. Constructing the hierarchical structure with decision elements, decision-makers make pair-wise comparisons between decision alternatives and criteria using a nine-point scale. All matrices are developed and all pair-wise comparisons are obtained from each n decision-maker(s). The Saaty's Fundamental scale (Saaty, 2008) of absolute numbers is used for pair-wise comparison matrix. This scale is giving the preferences for each two of the

Table 3.4: The Components of QM

S.N.	Components	Operational Description	Based on the Work of
1.	Use of team processes (TP)	A team is a group of individual, each with specific skills and knowledge of interests that enable the member to contribute to the accomplishment of common purpose.	Florida Power and Light company, 1982.
		The company could never produce high quality if manufacturing alone had to shoulder the burden of producing quality. Instead, quality had to be created and monitored by teams of personnel from different department.	Feigenbaum, 1956.
		Number of team registered, number of problem solved to number of problem undertaken and net saving in rupees by implementing the improved method suggested by team, can be considered as indicators to measure the performance of team activities.	Crosby, 1980; Deming, 1982; 1986; Gravin, 1984; Ishikawa, 1985; Juran and Gryna, 1988; Feigenbaum, 1991; Bank, 1995.
2.	Focus on internal customer (FI)	Each employee or department is a customer for output from another employee or department and in turn has a customer to whom he provides output. With this concept, quality becomes an individual responsibility.	Hermann and Baker, 1985.
		To touch off a dialogue between the internal suppliers and internal customers that leads them to agree customer requirements is the beginning of creating a total quality culture. Quality cannot be attained externally until it is internally.	Bank, 1995
		Percentage of staff aware of the concept of internal customer, percentage of staff satisfied with the quality service received from their internal supplier, average no. of awareness programmes conducted are considered as an indicator for measuring the components-focus on internal customer.	Juran and Gryna, 1988.
3.	Emphasis on the use of data (UD)	Management information programs provide the precise relevant quality data as a guideline to managerial and technical action. The major information areas are: economic data in the form of quality costs; customer data about product satisfaction and; engineering, production, inspection and test data about quality levels. Quality information programs employ the data as a fundamental factor in the company and the plant information system, gearing the information to the measurement and the control of the important areas that impact quality control permanent corrective action.	Feigenbaum, 1991.
		Percentage of employees trained in use of data (out of employee supposed to be trained), number of cases in which the data is used for analysis and decision making, no. of evidences where the past decisions are alerted due to the use of data, can be used as a indicator for measuring the emphasis on the use of data.	Crosby, 1980; Deming, 1982, 1986; Ishikawa, 1985; Juran and Gryna, 1996; Cheng and Dawson, 1998.
4.	Common understanding of quality (UQ)	Quality awareness can also be improved by involving all employees to enables company to make products of quality which could complete successfully in the market-place. For some product this is still the case, but it is no longer the case for sophisticated modern products. So the need is to extend training in quality related matter to personnel in all function.	Juran and Gryna, 1988; Cheng and Dawson, 1998.
		Percentage of staff, aware of the concept of quality ability to understand and express customers' needs and average no of training programmes conducted to improve quality awareness are considered as a indicators for measuring quality awareness among employees.	Derric et al., 1989; Feigenbaum, 1991; Swiss, 1992.

5.	Understanding of customer need (CN)	The needs of all customers have to be met, and the product / service features should be responsive to those needs. This applies to both external and internal customers. In the case of external customers, product salability. In case of internal customers, the response determines the company's competitiveness in productivity, quality etc. as well as the state of morale among internal departments.	
		To measure this concepts, three measures are used i.e. percentage ability to express customer needs in terms of international activities (specification); percentage of budget spent on identifying customer needs; and average no of training programmes conducted to know customer needs.	Juran and Gryna, 1988; Gertz, 1994.
6.	Supplier partnership (SP)	The secure quality improvement, it is very necessary to achieve teamwork relationship with suppliers.	Millers and Kegaris, 1986.
		To create such teamwork, environment has required some policy changes i.e. joint quality planning, long-term purchase agreement, fewer suppliers, technical assistance to suppliers, published quality policy, suppliers seminar, process controls, incentive programmes, supplier survey and rating.	Lascelles and Dale, 1988; Juran and Gryna, 1988; Feingenbaum, 1991.
		To understand the status of relationship with the supplies, the three measures can be used i.e. financial and technical help renders to suppliers in terms of rupees; percentage of suppliers continued in last three years; and average no of seminar organized.	Starr and Miller, 1986; Juran and Gryna, 1988; Feingenbaum, 1991; Mohan, 1996; Forker et al., 1997.
7.	Understanding of the organizational process (OP)	Documentation: A document is any written or printed information that is going to provide evidence that the company has a system that conforms to the standards. The appropriate documentation is important for two major reasons: i. To accomplish to the company's quality objectives ii. To evaluate quality systems by audits and management review to create and maintain a continuous quality improvement loop.	
		Problems in Documentations: The problems, generally faced are knowledge of processes; language; training; financial problems; personal capabilities and management capabilities.	
		For measuring this components, the measures used are percentage of processes documented; percentage of employees aware about the documentation and percentage clarity of the undocumented features of the processes.	Starr and Miller, 1986; Juran and Gryna, 1988; Feingenbaum, 1991.
8.	Understanding of Tech. of improvements (TI)	Number of various improvement techniques used; no. of training program organized to educate the employees in use of various technique of improvement and percentage of staff trained can be used as an indicator to know the understanding of techniques of improvement.	Crosby, 1980; Porter 1980; Starr and Miller, 1986; Montgomery, 1991; Soim, 1993; Zaidi, 1995
		The techniques for improvement are grouped in four categories, which are- i. Management methods: The techniques included under this head helps the management to manage the quality of an organization. Some of the methods are Deming wheel (PDCA), departmental purpose analysis (DPA), error proofing (Poka-yoke), cost-benefit analysis, benchmarking, pareto analysis, potential problem analysis, QFD, etc.	

		<p>ii. Analytical methods: The techniques in this category include cause and effect diagram, critical path analysis (CPA), fault tree Analysis, failure mode and effect analysis, Taguchi method and tolerance design etc.</p> <p>iii. Idea Generation: The techniques included in this category are used to generate new ideas in order to improve quality. It includes brainstorming, opportunity analysis, idea writing, buzz group, lateral thinking.</p> <p>iv. Data collection, analysis and display: The techniques under this head are used to collect data of product or process, analyze it and display in order to improve quality. It includes bar chart, check sheet, flow chart, histograms, 'P' chart, scatter diagram etc.</p>	
9.	Improvement ability (IA)	<p>If the prerequisites are present i.e. quality improvement skills, understanding of organization processes, understanding of customer needs, and good relation with suppliers then it is expected that the organization can improve its processes and achieve reductions in waste resulting in customer satisfaction.</p> <p>These components can be capture with two measures viz. percentage understanding of the knowledge of how techniques can be applied to major processes and average number of evidences of improvements.</p>	Eilon, 1994; Juran and Gryna, 1988.
10.	Customer need fulfillment ability (CA)	<p>Evidences of improvement in customers' satisfaction can represent the ability of the organization to meet the need of the customers.</p> <p>Cost of warranty (per year), total no. of complaints received to sales (in units) per year and percentage rise in sales volume, can be used as a measure for knowing the ability to meet the need of the customers.</p>	Sasaki, 1978; Juran and Gryna, 1988.
11.	Variability reduction ability of product to provide greater reliability (VA)	<p>When a great variety exists, a sales analysis can be made to establish the stability of products. When the accumulative sales income is plotted against the no. of products offered for sale, it is very often revealed that 25% of the product brought in 75% of the income. This leads to unnecessary drains of the firm's efforts, which can be directed to promoting the more profitable and reliable products.</p> <p>Number of product variety reduced, percentage rise in sales and machine utilization due to reduced variability of product can be used as a indicators to know the ability of firms to reduce variability of its products to provide greater reliability.</p>	Eilon, 1994.
12.	Ability to reduce waste (RW)	<p>Waste refers to any element of production that only adds to cost without increasing value.</p> <p>Ability to reduce waste, can be measured with three parameters i.e. no. of evidences which show reduction in waste, COQ as percentage of sales and saving in rupees per year through reduced waste.</p> <p>Waste can be classified into the following categories.</p> <ol style="list-style-type: none"> <li>By nature - avoidable and unavoidable waste</li> <li>By their causes</li> <li>By resources-waste of man hours, material,</li> <li>By output machine, production facilities and infrastructure</li> </ol>	<p>Ohno, 1991.</p> <p>Starr and Miller, 1986; Juran and Gryna, 1988. Feingenbaum, 1991; Adam, 1994; Chadha, 1999.</p>

variables by using a Saaty's fundamental scale of absolute numbers. The Saaty's fundamental scale is shown in the Table 3.5.

Table 3.5: Fundamental Scale of Absolute Numbers

Intensity of importance	Definition	Explanation
1	Equal importance	Two activities contribute equally to the objective
2	Least Important	
3	Moderate importance	Experience and judgment slightly favor one activity over another
4	Moderate plus	
5	Strong importance	Experience and judgment strongly favor one activity over another
6	Strong plus	
7	Very strong or demonstrated importance	An activity is favored very strongly over another; its dominance demonstrated in practice
8	Very, very strong	
9	Extreme important	The evidence favoring one activity over another is of the highest possible order of affirmation
Source: Saaty, 2008		

**Step 2: Calculating the consistency:** To ensure that the priority of elements is consistent, the maximum eigenvector or relative weights and  $\lambda_{\max}$  is calculated. Then, the consistency index (CI)  $\mu$  for each matrix order  $n$  is computed. Based on the CI ( $\mu$ ) and random consistency index (RCI), the consistency ratio (CR) is calculated by comparing the CI ( $\mu$ ) with the RCI (Saaty, 1980; Malczewski, 1999). The RCI is obtained from a large number of simulation runs and varies depending upon the order of matrix, which shown in Table 3.6.

Table 3.6: Fundamental Scale of Absolute Numbers for RI

Order	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
RCI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.54	1.56	1.58	1.59
Source: Saaty, 2008; Kordi, 2008															

As the results are not dependent on perfect consistency (random judgment), this rarely exists in practice. Saaty suggested that a CR less than 0.10 or 10% is considered adequate. If CR more than 0.1 or 10% the inconsistency of judgments within that matrix has occurred and the evaluation process should therefore be reviewed, reconsidered and improved (Crowe et al., 1998; Saaty, 2008).

**Step 3: Calculating weight value and constructing the hierarchy:** These paired comparisons are carried out for all factors to be considered and determine the geometric mean. The weightage of QM variables was calculated by individual response by criterion priority matrix. The average or mean value of each CSF was calculated by summarizing the all responses. This calculated weight of variable decides the hierarchy of QM variables.

The detail examination of this research methodology is given next chapter. This chapter dealt with the research methodology used to carry this research work. The various types of questionnaire were used for data collection and various statistical methods suitable for the analysis of these data were explained this chapter. The next chapter discusses data collection and data analysis for different surveys.

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## **CHAPTER 4: Data Analysis and Result Discussion**

The survey and interview method is used for the data collection. Based on the literature survey and discussion with experts in field of QM, variables of QM practices and performance as critical success factors of QM was found and considered for this study. The questionnaires were sent to the highest level of management with instruction to pass them to the most appropriate person.

The aim of initial five question of survey was concerned with assessing the organizational practices and policies of MSMEs of Nashik District of Maharashtra state in India. It identified the familiarity MSMEs with the principles of QM. Question 6 is emphasis on detail study of MSMEs to identify its strength, weakness, opportunities and threats. SWOT analysis can be used for this purpose. In last part of questionnaire data collection was made through the lens of AHP methodology. An attempt was made to consolidate a list of twelve CSFs affecting QM implementations that are derived from a review of an existing literature and empirical evidence based on practitioner's reflections. The relative importance of these CSFs was mapped to the findings of researcher's recent studies reported in the literature. The CSFs which were advocated by these studies are shown at Annexure-I. At last data were collected for to identify the degree to which the various components of QM are present in the organization. It assesses the usefulness of the developed model.

In this survey question no. 1, 2, 3 and 5 are closed ended and for question no. 4 and 6 the respondents were asked to indicate the significance of the listed enablers on a five-point Likert scale. On this scale, 1 and 5 correspond to 'most significant enabler' to 'least significant enabler', respectively. For this study selected sample size of 375 MSMEs and out of these 217 MSMEs has responded for first five questions. So for first five question response rate of 57.86%. The total 161 MSMEs attempted the SWOT analysis question with response rate of 42.93%. The respondents were not attempted the question eight and it is skipped from this study as it is not affected the result of this research work. The total 22.93% MSMEs were responded for question seven. So, only 86 questionnaires were considered for identification of weightage of each CSFs. The pair-wise comparison method (PCM) of AHP analysis is used for the same. For checking the degree of performance of CSFs quality experts were selected in the field of QM. To increase the response rate, a reminder was sent to each of the companies, personal calls were also

made in some cases. A response rate of above 20% is considered desirable for survey findings (Yu and Cooper, 1983). Malhotra and Grover (1998) have also suggested a response rate of 20% for positive assessment of the surveys. On the basis of responses data was analyzed and presented in next section.

#### 4.1 Present Status of MSMEs

The Phase-I questionnaire contains three sections viz. organization details, present states of QM issues and QM barriers.

**a. Size of firms:** The sizes of firms under survey various from sector to sector. The numbers of employees in studied MSMEs are shown in Figure 4.1.

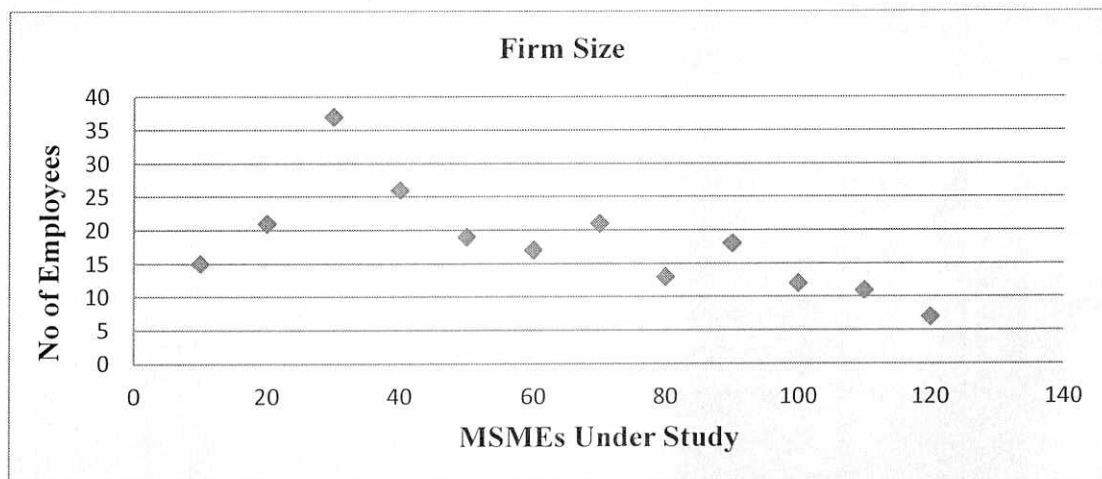


Figure 4.1: Graphical Representation of Firm Size

**b. Target Respondents:** The MSMEs in Nashik district are working in various sectors. The sector-wise details of existing MSMEs of Nashik District are Food Products and Beverages, Textile, Chemicals & Chemical Products, Rubber & Plastic Products, Manufacture of Fabricated Metal Products, Manufacture of Machinery & Equipment, Manufacture of Electrical, Machinery & Apparatus, Furniture and other which include Non-Metallic mineral products, Basic Metals, Computer & related activities. The response to the questionnaire in the survey study is shown in Figure 4.2.

**c. QM Practices:** In survey the response to professional qualification and experience of quality officials is given by 198 MSMEs and response rate is 91.24%. It has found that only 66.67% of quality officials are graduate and 41.92% are experienced. In most of the MSMEs the respondents is responsible for quality control and he may be a Managing Director. Technical Director or equivalent means quality control manager. Quality person



report their findings directly to the Managing Directors or Technical Directors or equivalent. In the total response the 24.88% respondent are ancillary units.

For the operation and quality control, about 42.86% of the companies in the sample have formal quality control procedures but few i.e. 28.57% of MSMEs are aware about the quality concept and its implementation.

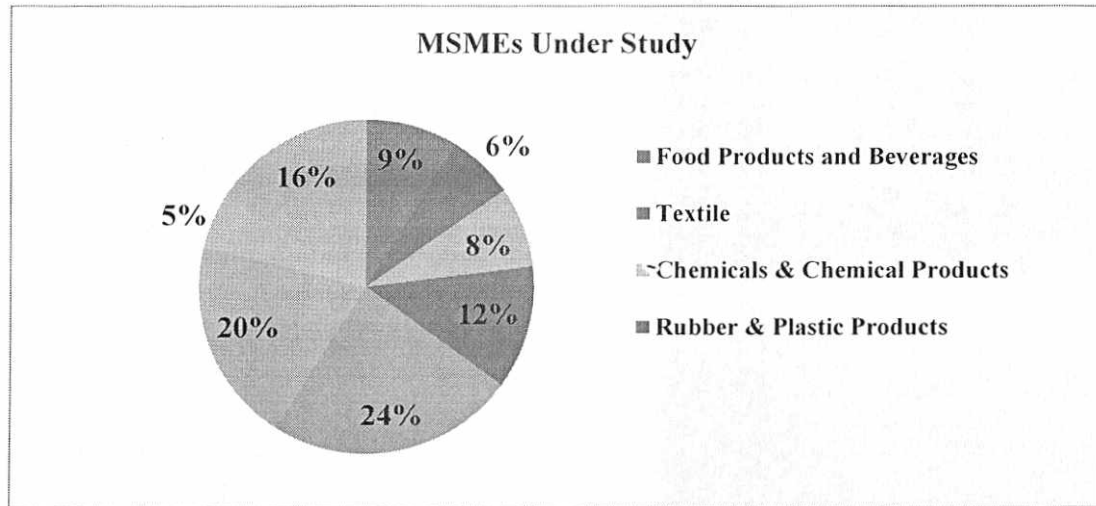


Figure 4.2: Sector-wise Number of Respondent

The analysis shows that two quality approaches are commonly used by Nashik district MSMEs i.e. traditional approach (46.54%) and ISO certification (32.72%). Only 14.29% MSMEs are used TQM and TQC approach. The graphical representations of quality approaches are commonly used by Nashik district MSMEs are shown in Figure 4.3.

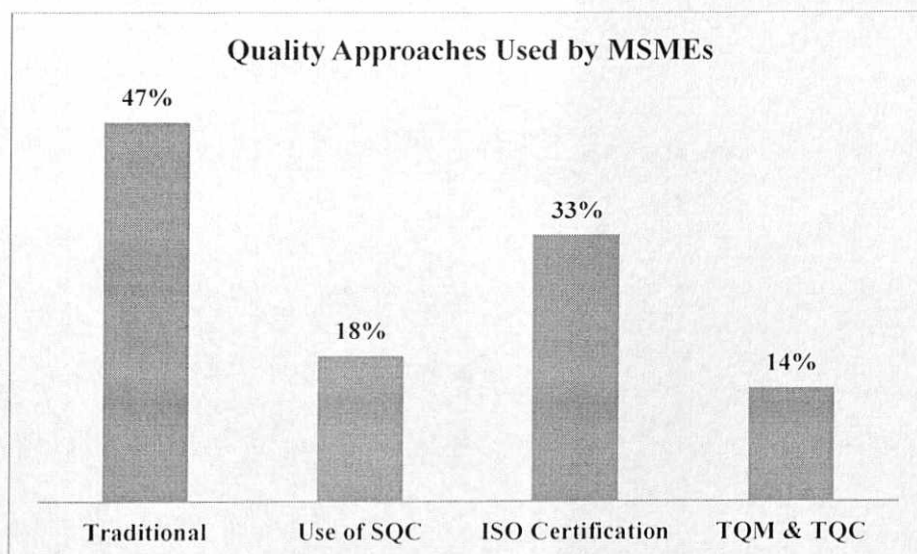


Figure 4.3: Quality Approaches Used by MSMEs

From survey it is identified that about 93.55 % of the respondents have written specifications in terms of quality tolerance limit for all products. About 48.85% MSMEs have set down specifications for all raw material intakes and 71.89% of the MSMEs have written specifications for process. It is of interest to determine to what extent sampling techniques are being applied in MSMEs. Survey shows that 42.86%, 44.70% and 93.55% of studied MSMEs have used statistical based sampling for raw material, process and product respectively. These MSMEs have taken the sample, analyzed and made corrections for quality assurance.

Indian MSMEs existing competitive strategies have been to compete on the basis of price and by offering service to specific market segments. There is almost total unanimity that the desirable competitive strategies should be to compete on the basis of quality and by offering novel or unique services. Once again quality strategy and innovative culture are the desirable directions of change. The analysis shows the important motivational factors to improve the quality are competition (54.84%); need to reduce cost (28.11%); customer satisfaction (35.48%) and reputation (7.83%). These factors are already been identified as the CSFs for QM implementation. Figure 4.4 shows the ranking of the motivational factor for quality improvement.

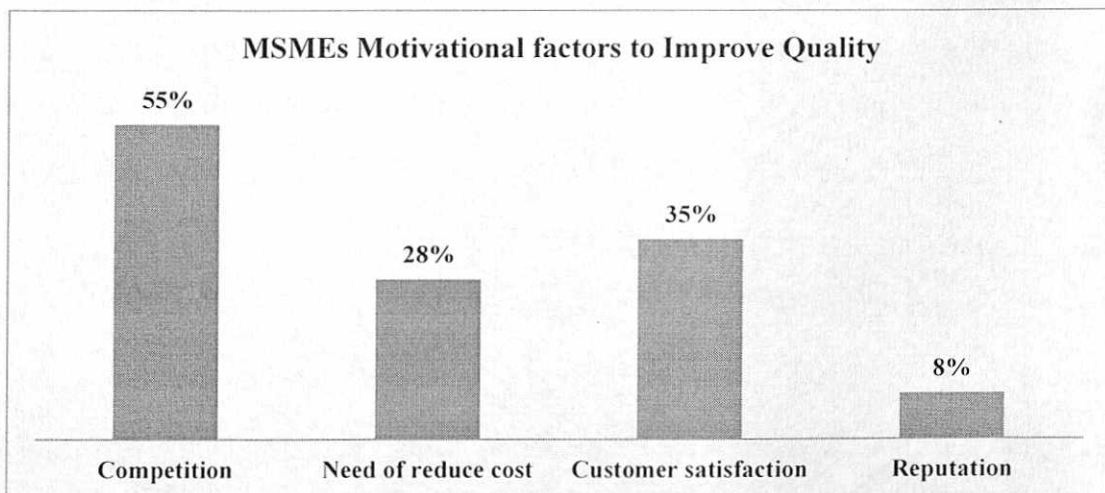


Figure 4.4: Motivational factors to Improve Quality in MSMEs

The analyses of the responses to other questions of this survey were then used to support or disapprove this emerging understanding. Question four attempted to understand what are and what should be the organizational values, quality management variables, quality variables, motivational factors and barriers in adopting QM for MSMEs.

It was recalled that these responses were respondent's opinion about the policies and practices which their MSMEs have adopted.

The identified quality variables are given in structure questionnaires in Annexure-I. For identifying the variables in quality management, likert-type point scale was used. In which, 1 indicate most favorable response possible and so on. The sum of the responses was used to rank the variables. The lowest sum has given first rank and the highest sum has the last rank.

With respect to organizational structure and management system, Target MSMEs are trying to put emphasis on management commitment, process control, employee commitment, use of SQC techniques and training for improving the quality of product. These are the five most significant variables out of fifteen considered variables. Figure 4.5 shows the importance of quality variables for quality improvement.

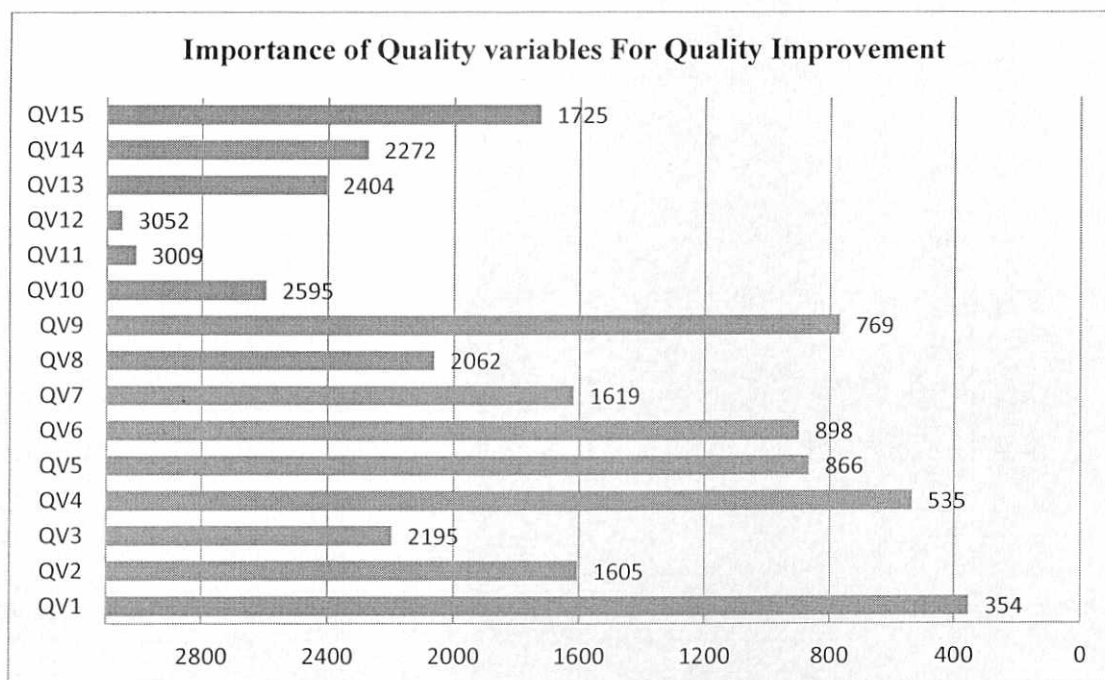


Figure 4.5: Importance of Quality Variables for Quality Improvement in MSMEs

It is observed that the quality approaches like ISO certification, SQC, TQC and TQM are used by 32.72%, 17.97%, 8.76% and 5.53% of studied MSMEs respectively. The survey reveals that some of the MSMEs are aware about the TQM concept; nevertheless none of them have ever used it in their respective organizations.

The MSMEs of the target segment indicate a need to explore various ways and means to change the mindset of managements in these MSMEs to make them globally competitive.

Out of the identified nine barriers in adopting QM, the four most affecting barriers are poor information on QM (35.94%), low level of awareness and understanding of quality among employees (28.11%), lack of employee co-operation (23.50%) and lack of management commitment (17.97%). Figure 4.6 shows the graphical representation of important barriers in adopting QM in studied MSMEs.

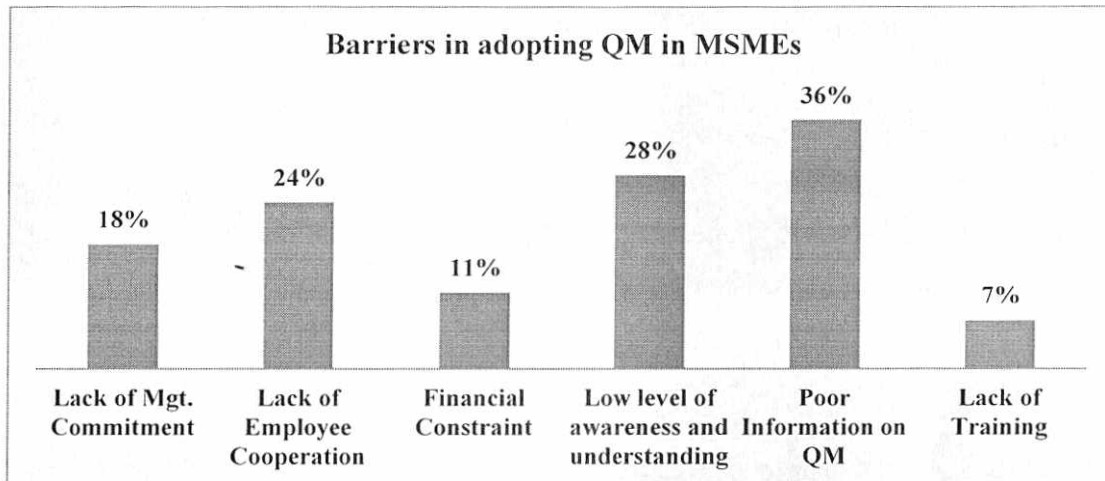


Figure 4.6: Barriers in Adopting QM Practices in MSMEs

QM is a philosophy to enhance an organization's productivity and produce high quality products and service by minimizing the energy and reducing the costs. Implementation of QM is not easy, but its payoff is huge. Management has to invest time, money and resources for a successful implementation. The organization as a whole should be dedicated and committed to QM. There should be free flow of communication and information both horizontally and vertically transcending all levels within an organization. Processes need to standardize and maintenance needs to be planned. Extensive training has to be given throughout the organization on QM and its benefits. Successful implementation of QM initiatives can be rationally actualized in MSMEs through radical culture change and zealous commitment by top management. The adopting new QM approaches may develop the present situation of MSMEs and transform into excellent business organization.

From above study it is observed that the present situation of MSMEs is not very satisfactory; nevertheless it seems that all the problems existing presently can be overcome through education, communication, participation and facilitation as suggested by Saraph et al., (1989).

On this background, it is felt that there is a need for detail study of MSMEs to identify its strength, weakness, opportunities and threats (SWOT) and SWOT analysis can be used for this purpose.

#### **4.2 SWOT Analysis**

SWOT is the combination of four major terms as strength, opportunity, weakness and threats. Strength refers to inherent abilities to complete and grow strong. Weaknesses are the inherent deficiencies that cripple one's growth and survival. Strength and weakness are mostly internal. Opportunities are the good chances and openings available for growth. These are environmental and external. Threats are extremely wielded challenges, which might suppress inherent strength, accelerate weakness and stifle with opportunities being exploited. These are again posed due to the external environment.

SWOT analysis is one of the effective analytical tools to evaluate a situation. The situation may be strategic related or capabilities related. This question is attempted to assess the strengths and weakness and by doing enquiry in more natural settings, collecting more situational information, the post-positivist attempts to get closer to the reality.

The aim of SWOT analysis is to identify the extent to which the current strategy of an organization and its more specify strength and weakness are relevant to, and capable of dealing with the change taking place in the business environment. Every unit must be aware of their SWOT. It is commonly classified an external and internal factors. For the external factor, it consists to the opportunities and threats, whereas the internal factors are strengths and weaknesses. The identified SWOT factors are given in structure questionnaires in Annexure-I. For identifying the rank of various factors considered under SWOT and environment, Likert type five point scales were used. In which, 1 indicates most favorable response. The sum of the responses for each factor was calculated. The factor having lowest sum has considered as most important and highest sum has considered as least important factor under studied MSMEs. Figure 4.7 shows the important strength and weakness factor and Figure 4.8 shows the important threat, opportunity and environmental factors of studied MSMEs.

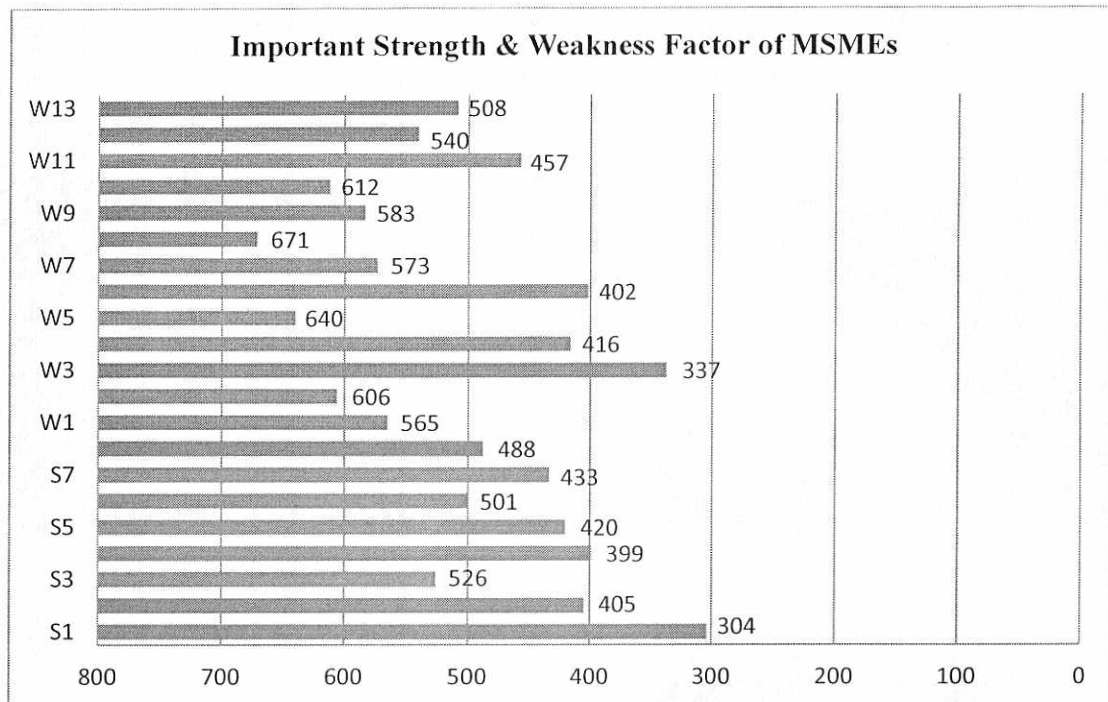


Figure 4.7: Important Strength & Weakness Factor of MSMEs

The major strengths of studied MSMEs are flexibility and owners management, and it is also getting the benefits of inexpensive labour and less overhead. The closeness to market and co- operation from employees are the least important strength of studied MSMEs. The most important five weaknesses are lack of quality consciousness, underutilization of capacity, lack of financial strength, high percentage of absenteeism and lack of quality work culture. It is identified that studied MSMEs are not putting the adequate attention to R & D, lack of infrastructure facilities, and lack of long term strategic focus. The threat competition from large and multinational business has lower score and ranked one, whereas financial stringency and negligence towards industrial training has ranked second and third in their category respectively. The important opportunities are export market, Govt. support and incentives for facing the new challenges for performance improvement.

**Environmental factors:** The main environmental factors affecting the performance of the MSMEs were found to be competition from large and multinationals, Govt. support (financial and non- financial), rise in expectation of customer, shortage of raw material, export market, ancillarisation to large industry and political will and stability.

SWOT analysis can be performed in a variety of application or situation. It can be used as a situation analysis as an input into a strategic planning process at corporate or company level. It can also apply to evaluate the situation in terms of its capabilities.

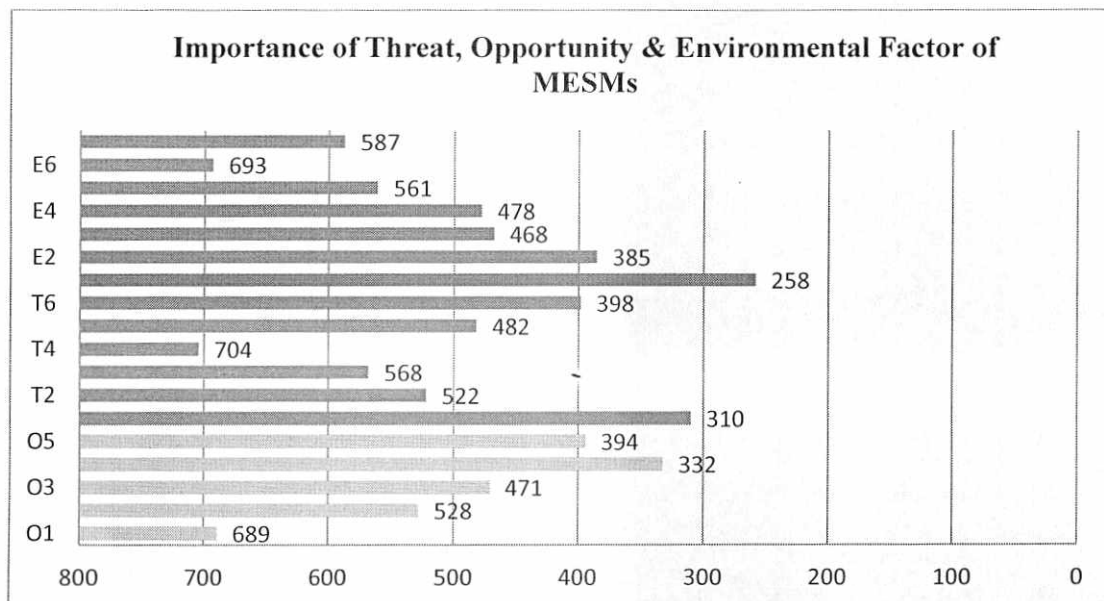


Figure 4.8: Important Threat, Opportunity and Environmental Factors of MSMEs

### 4.3 Situational Analysis of MSMEs

The situation analysis a strategic planning process tool was used to analyze the data. The objective is to build a foundation for good decision making on program priorities and the use of limited resources. Data were collected on common platform from stake holders and care has been taken for maintaining the uniformity. Data of entrepreneur, managers and supervisors is taken from different units and compared accordingly, so as to maintain the uniformity.

Situation analysis is a planning step which helps to examine the current situation of organization and external environment so that one can identify and agree on major issues (IFUW, 2007). In this analysis, the statement was examined one against another on the lines suggested by Johnson and Scholes (1994). The analysis of the outcomes would basically be gap analysis; i.e. comparing the actual situation with the planning standards or other norms. Analysis of the time series would show whether the situation is improving or deteriorating. The main strength and weakness are in the left hand column, and are examined in terms of the key environmental issues. The selection grid, which shows the scores of '+' or '-' or '0' is shown in Table 4.1. The detail explanation of score marking is as:

1. Marking ‘+’ if there was a benefit to MSMEs, i.e. if: -
  - A strength enabled to take advantage of or counteract a problem arising from environmental change;
  - A weakness was likely to be offset by the change.
2. Marking ‘-’ if there was an adverse effect on MSMEs, i.e. if: -
  - A strength was likely to be reduced by the change,
  - A weakness prevented the organization from overcoming the problems associated with the change or was accentuated by that change.
3. Marking ‘0’ if there was no effect on MSMEs.

What this analysis yield is a much clearer view of the extent to which the environmental changes and influences provide opportunities or threats, given current strategies and organizational capabilities. The situation analysis carried out in this section and selection grid focused on major issues which help for examination of current situation of MSMEs and external environment. The major opportunities lie in the utilization of financial and non-financial support extended by government and gain vast export market. Owner management and flexibility are the some other areas, which provide opportunities for growth. Likewise, the ‘-ve’ sign indicates the threats which is not permitted to overcome problem and reduces the strength of organization. The major external issues identified for the MSMEs of this region are competition from large and multinational organization, export market and rise in expectation of customer, which has high score of ‘-ve’ value. The major internal issues are lack of financial strength, lack of quality consciousness, lack of financial strength, lack of quality work culture and need of trained workers. So the thrust areas for MSMEs of this region are-

- i. Education and training to manager/ entrepreneur regarding the benefits and need of continuous improvement;
- ii. Education and training to employees on various aspects like quality and its need, importance of continuous improvement, use of data and understanding of processes;
- iii. Adoption of philosophy of continuous improvement

To succeed in any field, weakness must be overcome through strength and threats must be transferred into opportunities. In the light of the above considerations, the need for quality initiatives in MSMEs was felt.

Table 4.1: Approaches used for Managing Quality- Selection Grid



Factors	Competition from large and multinationals	Govt. Support (Financial/ non financial)	Rise in expectation of customer	Shortage of raw material	Export market	Ancillarisation to large Industry	Political will and stability	Total		
								0	+	-
<b>Strengths</b>								0	+	-
Flexibility	+	+	+	+	+	+	+	-	7	-
Owners management	+	+	+	+	+	+	+	-	7	-
In-expensive labour	+	0	+	0	+	+	+	2	5	-
Less overheads	+	0	+	0	+	+	+	2	5	-
Favorable capital output ratio	0	0	0	0	+	+	0	5	2	-
<b>Weakness</b>										
Lack of quality consciousness	-	+	-	0	-	-	0	2	1	4
Under utilization of capacity	-	+	0	-	-	+	0	2	2	3
Lack of financial strength	-	+	-	0	-	-	0	2	1	4
High absenteeism	-	0	-	0	-	0	0	4	-	3
Lack of quality work culture	-	+	-	0	-	-	0	2	1	4
Lack of trained workers	-	+	-	0	-	-	0	2	1	4
0	1	4	2	8	-	1	6			
+	4	7	4	2	5	6	4			
-	6	-	5	1	6	4	1			

#### 4.4 Development of Quality Model

In spite of the various lacunas, it is felt that with the existing technology and manpower, MSMEs can do miracle by adopting a philosophy of continuous improvement. Poor information on QM, low level of awareness and understanding, and non availability of a specially developed QM model are found to be the main barriers in the process of adoption of QM philosophy in MSMEs. On this background it is decided to develop a QM model which suit to the needs of MSMEs. Study of existing self assessment and quality awards model should be the first step in the development of 'Proposed QM

Model'. The detailed examinations of various quality award models have been well received in literature review.

The purpose of creating this model was to set a challenge for industry to scale new heights of quality and leadership. This analytical study is carried out by using the paired comparison approach developed by T.L. Saaty and popularly known as AHP. This exercise determines ranking of the various criteria according to their importance.

For the purpose of researching the value of QM in MSMEs the framework of S-P model is used (Saunders and Preston, 1994). This model provides a useful framework for study of the applicability of QM practices in MSMEs. This model of QM overcomes some of the existing problems in the study of QM implementation.

For AHP analysis, data were collected by quality experts from MSMEs through a well designed questionnaire. The question seven of Annexure-I collects the data for to determine the weightage of CSF and the list of attributes which were advocated by these studies is shown in Annexure-I. It is derived from a review of an existing literature and empirical evidence based on practitioner's reflections. The sub-attributes are omitted from this study as there was no response from the respondent and it will affect the objective of this study.

In AHP the decision making process starts with dividing the problem into a hierarchy of issues which should be considered in the work. These hierarchical orders help to simplify the illustration of the problem and bring it to a condition which is more easily understood. In each hierarchical level the weights of the elements are calculated. The decision on the final goal is made considering the weights of criteria and alternatives or attributes.

For creating the pair-wise comparison matrix in the PCM, Saaty has employed a system of numbers to indicate how much one criterion is more important than the other.

These numerical scale values and their corresponding intensities are recalled in Table 3.5. In order to compare homogeneous elements whose comparison falls within one unit, decimals are used (Saaty, 2006). If the elements of the pair-wise comparison matrix are shown with  $C_{ij}$ , which indicates the importance of  $i^{th}$  criterion over  $j^{th}$ , then  $C_{ji}$  could be calculated as  $1/C_{ij}$  (Borouhaki and Malczewski, 2008).

The AHP method employs different techniques to determine the final weights: one of the methods is geometric mean. According to Buckley (1985) the weights in pair-wise comparison matrix of attributes and sub-attributes are calculated by following formula.

$$r_i = \prod_{j=1}^n (a_{ij})^{1/n}$$

Where,  $r_i$  represents the geometric mean of  $i^{th}$  criterion at which  $a_{ij}$  ( $i, j= 1, \dots, n$ ) are the comparison ratios in the pair-wise comparison matrix and  $n$  is number of attributes. The numbers of attributes considered for this study are twelve.

The relative priority of each criterion or weightage is then calculated by normalizing this column by dividing each value by the total of the column (or the sum of the geometric mean values)

$$w_i = \frac{r_i}{\sum_j r_j}$$

Where,  $w_i$  represents the relative priority of  $i^{th}$  criterion.

In this method special mathematical conditions are required to guarantee that a unique answer is yielded. Also difficulties in calculating and finding the eigenvalues and vectors have led to use of an approximation to the lambda max method. As Malczewski (1999) used in his book an approximation of the eigenvector associated with the maximum eigenvalue is calculated through a simple procedure which is sometimes referred to as mean of normalized values. The accuracy of this approximation is increased when the pairwise comparison matrix has a low consistency ratio.

**Consistency ratio in the AHP:** However in practice it is unrealistic to expect the decision-makers provide pair-wise comparison matrices which are exactly consistent especially in the cases with a large number of alternatives. Expressing the real feelings of the decision makers generally lead to matrices that are not quite consistent. However some matrices might violate consistency very slightly by only two or three elements while others may have values that cannot even be called close to consistency.

A measure of how far a matrix is from consistency is performed by CR. Han and Tsay (1998) explained that having the value of  $\lambda_{max}$  required in calculating the CR. This is obtained by calculating matrix product of the pair-wise comparison matrix and the weight vectors and then adding all elements of the resulting vector. After that a CI ( $\mu$ ) is introduced as-

$$\mu = \frac{\lambda_{max} - n}{n - 1}$$

Where,  $\lambda_{max}$  is the biggest eigenvalue at which  $n$  is the number of criteria (i.e. 12).

The approximation of the maximum eigenvalue  $\lambda_{max}$  is calculated by adding all products of total resultant vector and priority vector. RCI is the consistency index of a pair-wise comparison matrix which is generated randomly. Random index depends on the number of elements which are compared and as it is shown in Table 3.5. The CR used as the main indicator of ranking consistency, and calculated by dividing the CI value ( $\mu$ ) by the RCI value (Malczewski, 1999).

The CR given by

$$CR = \frac{\mu}{RCI}$$

For number of criterion  $n = 12$ , the value of RCI = 1.54 (Refer Table 3.6)

$$\therefore CR = \frac{\mu}{1.54}$$

The CR is designed such a way that shows a reasonable level of consistency in the pair-wise comparisons if  $CR < 0.10$  and  $C.R. \geq 0.10$  indicate inconsistent judgments. If CR more than 0.1 or 10% the inconsistency of judgments within that matrix has occurred and the evaluation process should therefore be reviewed, reconsidered and improved.

The summary of mean weightage of attributes from the response of MSMEs is shown in Table 4.2.

Table 4.2: Summary of Weightage of Attributes Calculated from Response of MSMEs

Att	MSMEs Response																						
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
UD	0.12	0.13	0.11	0.12	0.13	0.11	0.17	0.12	0.13	0.14	0.12	0.17	0.11	0.08	0.13	0.15	0.13	0.12	0.11	0.13	0.20	0.14	0.13
SP	0.07	0.06	0.05	0.06	0.07	0.06	0.06	0.07	0.06	0.07	0.06	0.06	0.06	0.05	0.07	0.07	0.06	0.07	0.05	0.07	0.07	0.06	0.07
UQ	0.16	0.15	0.21	0.14	0.20	0.19	0.12	0.20	0.15	0.17	0.14	0.21	0.23	0.19	0.20	0.18	0.16	0.16	0.21	0.14	0.17	0.13	0.15
IA	0.05	0.05	0.07	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.07	0.06	0.06	0.05	0.05	0.04	0.07	0.07	0.05	0.07	0.06	0.05
CN	0.22	0.24	0.22	0.25	0.21	0.24	0.23	0.21	0.25	0.24	0.25	0.21	0.23	0.25	0.23	0.21	0.23	0.27	0.23	0.22	0.21	0.27	0.22
RW	0.01	0.01	0.02	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.01	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.01
FI	0.09	0.08	0.07	0.08	0.08	0.06	0.04	0.09	0.07	0.07	0.08	0.06	0.05	0.09	0.07	0.09	0.08	0.06	0.07	0.08	0.05	0.06	0.09
VA	0.03	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.03	0.03	0.02	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.04	0.02	0.03	0.03
TI	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.03	0.04	0.01	0.02	0.03	0.03	0.02	0.04	0.02	0.03	0.04	0.03	0.03
CA	0.19	0.19	0.15	0.19	0.15	0.16	0.16	0.15	0.19	0.16	0.19	0.08	0.15	0.15	0.14	0.15	0.19	0.13	0.15	0.20	0.09	0.15	0.19
OP	0.02	0.02	0.03	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.02	0.02	0.02	0.03	0.03	0.02	0.04	0.03	0.02
TP	0.01	0.02	0.02	0.02	0.01	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.01
Att	MSMEs Response																						
	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
UD	0.11	0.11	0.09	0.14	0.11	0.10	0.13	0.11	0.12	0.12	0.12	0.12	0.14	0.18	0.17	0.17	0.13	0.12	0.12	0.12	0.15	0.11	
SP	0.07	0.08	0.05	0.10	0.07	0.06	0.06	0.06	0.07	0.06	0.09	0.07	0.06	0.06	0.08	0.07	0.07	0.09	0.05	0.07	0.06	0.06	0.06
UQ	0.20	0.20	0.22	0.13	0.17	0.14	0.13	0.22	0.19	0.14	0.13	0.14	0.20	0.12	0.19	0.17	0.14	0.11	0.20	0.14	0.14	0.17	0.21
IA	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.06	0.05	0.05	0.05	0.07	0.06	0.05	0.06	0.05	0.05	0.05	0.05	0.06
CN	0.23	0.21	0.24	0.26	0.22	0.26	0.25	0.22	0.22	0.25	0.26	0.24	0.26	0.25	0.20	0.20	0.22	0.25	0.24	0.24	0.25	0.26	0.24
RW	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.03	0.01	0.02	0.01	0.02	0.01	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02
FI	0.05	0.07	0.08	0.05	0.08	0.08	0.08	0.07	0.05	0.08	0.07	0.07	0.07	0.08	0.05	0.05	0.06	0.05	0.07	0.08	0.08	0.06	0.05
VA	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.04
TI	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.01	0.03	0.03	0.03	0.02	0.02	0.04	0.02	0.03	0.03	0.01	0.03	0.03	0.02	0.01
CA	0.16	0.14	0.15	0.14	0.20	0.19	0.19	0.15	0.17	0.19	0.15	0.20	0.14	0.19	0.09	0.16	0.16	0.19	0.14	0.20	0.19	0.15	0.16
OP	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.02	0.03	0.02	0.02	0.02	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.03
TP	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.01

MSMEs Response																							
Att	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
UD	0.12	0.11	0.12	0.13	0.12	0.12	0.17	0.08	0.11	0.13	0.13	0.12	0.10	0.22	0.10	0.11	0.14	0.13	0.13	0.13	0.14	0.11	0.11
SP	0.08	0.06	0.07	0.07	0.06	0.06	0.07	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.06	0.07	0.07	0.08	0.07	0.07	0.05	0.06
UQ	0.13	0.15	0.18	0.16	0.14	0.23	0.20	0.22	0.19	0.17	0.16	0.15	0.13	0.18	0.22	0.15	0.18	0.18	0.14	0.18	0.14	0.21	0.20
IA	0.06	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.04	0.05	0.06	0.06	0.05	0.06	0.06	0.06	0.06	0.04	0.06	0.06
CN	0.25	0.25	0.22	0.22	0.25	0.23	0.22	0.25	0.22	0.22	0.26	0.24	0.27	0.19	0.23	0.25	0.22	0.24	0.25	0.25	0.24	0.24	0.24
RW	0.02	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02
FI	0.06	0.08	0.05	0.09	0.08	0.09	0.05	0.09	0.05	0.06	0.06	0.08	0.08	0.05	0.08	0.08	0.05	0.05	0.06	0.05	0.07	0.07	0.06
VA	0.03	0.04	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.03	0.03	0.04	0.04	0.02	0.04	0.04	0.03	0.04	0.02	0.03	0.04	0.04	0.03
TI	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.02	0.02	0.03	0.02	0.03	0.02	0.04	0.02	0.03	0.03	0.01	0.03	0.02	0.02	0.02	0.02
CA	0.18	0.19	0.17	0.19	0.19	0.12	0.10	0.13	0.17	0.17	0.16	0.19	0.20	0.10	0.13	0.19	0.16	0.17	0.17	0.16	0.19	0.15	0.17
OP	0.03	0.02	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.04	0.03	0.02	0.03	0.03	0.04	0.02	0.02	0.03	0.03
TP	0.01	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.01
MSMEs Response																							
	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	Total	Avg	Rank			
UD	0.17	0.12	0.10	0.12	0.12	0.06	0.11	0.11	0.12	0.11	0.12	0.12	0.20	0.11	0.19	0.20	0.11	10.985	0.128	7			
SP	0.09	0.08	0.05	0.06	0.06	0.05	0.07	0.07	0.07	0.06	0.07	0.06	0.07	0.05	0.07	0.07	0.05	5.618	0.065	11			
UQ	0.14	0.15	0.15	0.19	0.15	0.16	0.19	0.20	0.16	0.14	0.14	0.14	0.11	0.08	0.11	0.17	0.19	14.334	0.167	3			
IA	0.06	0.06	0.05	0.05	0.03	0.07	0.06	0.06	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.07	4.649	0.054	10			
CN	0.21	0.24	0.25	0.26	0.25	0.24	0.23	0.24	0.25	0.26	0.24	0.25	0.21	0.23	0.22	0.21	0.23	20.282	0.236	1			
RW	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	1.513	0.018	12			
FI	0.06	0.06	0.08	0.06	0.08	0.07	0.05	0.05	0.05	0.08	0.08	0.08	0.08	0.07	0.08	0.05	0.08	5.840	0.068	6			
VA	0.03	0.03	0.04	0.03	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.04	0.04	0.03	0.04	2.828	0.033	9			
TI	0.03	0.03	0.02	0.02	0.03	0.03	0.01	0.02	0.03	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.02	2.089	0.024	8			
CA	0.14	0.19	0.20	0.15	0.19	0.20	0.17	0.17	0.17	0.19	0.20	0.19	0.17	0.26	0.17	0.13	0.14	14.235	0.166	2			
OP	0.04	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	2.214	0.026	5			
TP	0.02	0.01	0.02	0.02	0.02	0.03	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	1.413	0.016	4			

The final weightage and rank of each attribute is shown in Table 4.2 and Table 4.3. In one point scale Understanding of customer need (CN) has got highest weightage of 0.294 and ranked first. Customer need fulfillment ability (CA) has got weightage of 0.282 and ranked second, whereas common understanding of quality (UQ) has ranked three with weightage of 0.202. The other attributes viz. use of team process (TP), understanding of the organizational process (OP), focus on internal customer (FI), emphasis on the use of data (UD), understanding of techniques of improvements (TI), variability reduction ability of product to provide greater reliability (VA), improvement ability (IA) has got the weightage of 0.156, 0.154, 0.149, 0.139, 0.129, 0.126, and 0.101 respectively. The attribute supplier partnership (SP) and ability to reduce waste (AW) has ranked last with the weightage of 0.089 and 0.087. The AHP model developed here can be useful for assessing the organizations on the basis of components of quality management. It can also identify the degree to which the various components of QM are present in the organization.

Table 4.3: Final Ranking and Weightage of QM Attributes

Attribute		Weight in Point Scale		Rank
Abb	Title	1	1000	
UD	Emphasis on the use of data	0.139	139	7
SP	Supplier partnership	0.089	89	11
UQ	Common understanding of quality	0.202	202	3
IA	Improvement ability	0.101	101	10
CN	Understanding of customer need	0.294	294	1
RW	Ability to reduce waste	0.087	87	12
FI	Focus on internal customer	0.149	149	6
VA	Variability reduction ability of product to provide greater reliability	0.126	126	9
TI	Understanding of Tech. of improvements	0.129	129	8
CA	Customer need fulfillment ability	0.282	282	2
OP	Understanding of the organizational process	0.154	154	5
TP	Use of team process	0.156	156	4

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## CHAPTER 5: Findings and Recommendations

QM is a philosophy to enhance an organization's productivity and produce high quality products and service by minimizing the energy and reducing the costs. Implementation of QM is not easy, but its payoff is huge. Management has to invest time, money and resources for a successful implementation. The organization as a whole should be dedicated and committed to QM. There should be free flow of communication and information both horizontally and vertically transcending all levels within an organization. Processes need to standardize and maintenance needs to be planned. Extensive training has to be given throughout the organization on QM and its benefits. Successful implementation of QM initiatives can be rationally actualized in MSMEs though radical culture change and zealous commitment by top management. The adopting new QM approaches may develop the present situation of MSMEs and transform into excellent business organization.

The analyses of the responses to questions of the survey were used to support or disapprove this emerging understanding. First phase questions was to understand what are and what should be the organizational values, quality variables, motivational factors and barriers in adopting QM for MSMEs. In second phase SWOT analysis was carried out for the MSMEs of Nashik district. This analysis focuses much clearer view of the extent to which the environmental changes and influences provide opportunities or threats, given current strategies and organizational capabilities. The situation analysis carried out and focused on major issues which help for examination of current situation of MSMEs and external environment. To succeed in any field, weakness must be overcome through strength and threats must be transferred into opportunities.

In spite of the various lacunas, it is felt that with the existing technology and manpower, MSMEs can do miracle by adopting a philosophy of continuous improvement. Poor information on QM, low level of awareness and understanding, and non availability of a specially developed QM model are found to be the main barriers in the process of adoption of QM philosophy in MSMEs. On this background it is decided to develop a QM model which suit to the needs of MSMEs. The purpose of creating this model was to set a challenge for industry to scale new heights of quality and leadership. This analytical study is carried out by using the paired comparison method of AHP tool. The paired comparison method was adopted as it is simple to administer to a generalist target group and provides reasonable confidence.



The model developed here can be useful for assessing the organizations on the basis of components of quality management. It can also identify the degree to which the various components of QM are present in the organization. The degrees of identified twelve attributes in the studied MSMEs are shown in Table 4. 3.

In general, from this study it is observed that there is scope for development in the present situation of MSMEs; nevertheless it seems that all the problems existing presently can be overcome through education, communication, participation and facilitation. The findings of the study are summaries below:

- i. Targeted MSMEs have recognized the importance of quality management, nevertheless many MSMEs using “Traditional approach’ for managing quality.
- ii. Management commitment, process control, employee commitment, use of SQC techniques and training are observed to be the five significant quality variables for studied MSMEs.
- iii. The main barriers in the adoption of QM philosophy are observed to be poor information on QM, low level of awareness and understanding of quality among employees, lack of employee co-operation and lack of management commitment.
- iv. Competition, need to reduce cost and customer satisfactions are most important motivational factor for quality improvement in MSMEs.
- v. MSMEs play important role in the development of economy; still the concept of QM is not yet adopted by MSMEs. Low use of QM implementation model especially developed for MSMEs is one of the identified reasons.
- vi. The major strength of MSMEs are observed to be flexibility, owners management, inexpensive labour, less overhead, favorable capital output ratio, flat management structure.
- vii. Lack of quality consciousness, under utilization of capacity, lack of financial strength, high percentage of absenteeism, poor quality work culture. It is identified that studied MSMEs are not putting the adequate attention to R & D and infrastructure facilities.
- viii. The opportunities for development of MSMEs are export market, government support and incentives for facing the new challenges for performance improvement. The reservation of product items by government is also the considerable opportunity to studied MSMEs.

- ix. The immediate threats to MSMEs are competition from large and multinationals, financial stringency, negligence towards industrial training.
- x. Competition from large and multinationals, rise in expectations of customers, government support, export market, shortage of raw material, ancillarization to large industries and political will and stability are found to be the main environmental factors affecting the performance of the MSMEs.
- xi. The thrust areas for studied MSMEs are-
  - a. Education and training to manager or entrepreneur regarding the benefits and need of continuous improvement;
  - b. Education and training to employees on various aspects like quality and its need; importance of continuous improvement, use of data and understanding of processes;
  - c. Adoption of philosophy of continuous improvement (TQM); and
- xii. The comparison of international and NQA model shows that the components like leadership, customer satisfaction, process management, people management and information analysis are considered by all.
- xiii. The 'Proposed QM Model' is developed the present situation of MSME. This QM implementation approach transforms MSMEs into excellent business organization.
- xiv. This study highlights the key areas of the MSME and proposed some more propositions for QM implementation which enhances improvement in the suggested attributes of organization.
- xv. This 'Proposed QM Model' consists of twelve attributes. The component 'Understanding of customer needs' and 'Customer need fulfillment ability' has considered as most important variable. 'Supplier relationship' and 'Ability to reduce waste' has rated as least important.
- xvi. The 'Proposed Model of QM' can be used to compare the MSMEs on the basis of QM attributes and evaluate the status of QM for the given set of attributes.

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## Research Summary

**Implementation of Quality Management Practices in Performance Improvement of Micro, Small, and Medium Enterprises Through Academic Intervention: A Step towards Industry Institution Interaction by V. P. Wani and S. D. Kalpande, MET's Institute of Engineering, BKC, Nashik, 2016.**

The objective this project is to develop model which suit to needs of MSMEs and provides useful framework for applicability of Quality Management (QM) practices in MSMEs in Nashik District, Maharashtra State. This study has investigated the present status of quality system and practices prevailing in the MSMEs. It also identified thrust areas for MSMEs, motivational factors for quality improvements, barriers in the adoption of QM, factors affecting quality and quality management, strengths, weaknesses, opportunities and threats. This work provides a quantitative and qualitative analysis for to get broader insights into the issues being investigated.

This study developed a model for assessing the components of QM for MSMEs which helps in self-assessment and used for comparing MSMEs on the basis of components of QM. The purpose of developing this model was to set a challenge for industry to scale new heights of quality and leadership. This analytical study is carried out by using paired comparison method of Analytic Hierarchy Process (AHP).

This model identified the degree to which various components of QM are present in targeted MSMEs. In single point scale, first five highest weightage attributes are understand of customer need (0.294), customer need fulfillment ability (0.282), common understanding of quality (0.202), use of team process (0.156) and understanding of the organizational process (0.154). The attribute improvement ability, supplier partnership and ability to reduce waste has ranked last with weightage of 0.101, 0.089 and 0.087 respectively.

A unique model developed here is very simple to understand and operate and will be definitely help to MSMEs in their journey of QM.

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**Annexure-I**

**Questionnaire Cover Letter**

Dear Sir,

We the investigator pursuing a sponsored project work under **National Science and Technology Management Information System (NSTMIS) funded by Department of Science & Technology Government of India, New Delhi**

This study entitled “Implementation of Quality Management Practices in Performance Improvement of Micro, Small, and Medium Enterprises through Academic Intervention: A Step towards Industry Institution Interaction” exploring the role of quality management practices in overall business performance.

The purpose of this survey is to identify the importance of QM attribute in your plant. In this connection, we may request you to spare some time and respond carefully to all questions. The questionnaire is enclosed herewith.

We would like to assure you that this survey is being taken for study purpose only. While we look forward to your responses to the questionnaire, your participation is totally voluntary and you are free to withdraw from completing this survey at any time. If you have any query, please do contact at the address given below.

You are requested to submit filled questionnaire to our representative or send by registered post or ordinary post or currier or by mail at address given below.

Thanking you.

**Investigator:** Dr. V. P. Wani (PI) & Dr. S. D. Kalpande (Co. PI)

**Address:** METs Institute of Engineering, Bhujbal Knowledge City, Nashik, Maharashtra,  
India, Pin. 422003.

**Email:** principal\_ioe@bkc.met.edu

**Annexure-I**

**Project Entitled “Implementation of Quality Management Practices in Performance Improvement of Micro Small and Medium Enterprises through Academic Intervention: A Step towards Industry Institute Interaction”**

*(Your response will be treated in strict confidence, not shared and used for this project only)*

**Questionnaire on Study of MSMEs**

**Organization Details**

Que.1. Kindly provide the following organization details.

S.N.	Question					Answer
1.	What is year of establishment of your plant?					
2.	How many number of employees work in your plant?					
3.	Total annual production of your plant. (in Rs.)					
4.	Total investment in land and machinery of your plant. (in Rs.)					
5.	What are the main products of your plant? (At least three products)					
6.	Last three years turnover of your plant.	Year	Upto 25 lakh	25 Lakh to 5 Cr.	5 Cr. To 10 Cr	More than 10 Cr (if any)
		(Please tick ‘√’ in appropriate row)				
		2012-13				
		2013-14				
	2014-15					
7.	Professional Qualification and Experience of Quality Officials					

**Present States of Quality Management Practices**

Que.2. Please tick ‘√’ in the appropriate column.

S. N.	Question		Yes	No
1.	Type of Unit : 1. Ancillary			
	2. Self Unit			
2.	Are you aware about quality concept and its implementation			
3.	Is there formally a quality control procedure in your plant?			
4.	Do you use statistical quality control tools?			
5.	Which of the quality approach is used for managing quality in your plant?			
	a.	Traditional approach		
	b.	Quality control (Use of SQC)		
	c.	ISO certification approach		
	d.	Total quality management (TQM)		
	e.	Total quality control (TQC)		
6.	Does your plant have a written specification for-			
	a.	Product		
	b.	Process		
	c.	Raw material		
7.	Sampling practice used in your plant for-			
	Raw material	a. Sample not takes		
		b. Sample taken, analyzed & correction are made		
	Process	a. Sample not takes		
		b. Sample taken, analyzed & correction are made		
	Product	a. Sample not takes		
b. Sample taken, analyzed & correction are made				

Que.3. Which factor strongly motivated you to improve quality? (Please tick '√' in appropriate row)

S.N.	Motivational factor	Tick
1.	Competition	
2.	Need of reduce cost	
3.	Customer satisfaction	
4.	Reputation	
5.	Restart situation	
6.	Any other, please specify.	

#### Quality Variables

Que.4. The Quality Variables of SMEs are given below. Please give them number from 1-5 according to their importance in improving the quality of your product.

1- Most important 2-Much important 3- Important 4- Less important 5- Least important

S.N.	Quality Variables	1	2	3	4	5
QV <sub>1</sub> .	Management commitment					
QV <sub>2</sub> .	Quality of material					
QV <sub>3</sub> .	Competition					
QV <sub>4</sub> .	Process control					
QV <sub>5</sub> .	Use of SQC techniques					
QV <sub>6</sub> .	Training					
QV <sub>7</sub> .	Managerial competence					
QV <sub>8</sub> .	Accurate documentation					
QV <sub>9</sub> .	Employee commitment					
QV <sub>10</sub> .	Communication					
QV <sub>11</sub> .	Cooperation from suppliers					
QV <sub>12</sub> .	Monetary incentives					
QV <sub>13</sub> .	Meet specification					
QV <sub>14</sub> .	Knowledgeable supervisors					
QV <sub>15</sub> .	Machine reliability					
QV <sub>16</sub> .	Any other, please specify.					

#### Barriers to QM

Que.5. What are the barriers in adopting TQM? (Please tick '√', which is applicable)

S.N.	Barriers in adopting TQM	1	2	3	4	5
1.	Lack of Management Commitment					
2.	Lack of Employee Cooperation					
3.	Lack of Leadership					
4.	Financial Constraint					
5.	Lack of Adequate Skills					
6.	Low level of awareness and understanding					
7.	Poor Information on TQM					
8.	Lack of Training					
9.	Technological Obsolesces					
10.	Any other, please specify.					

**SWOT Analysis**

Que.6.

- A. The strength of SMEs are given below. Please give them number from 1-5 according to their importance in improving performance of plant. (Please tick '√' in the appropriate column)  
 1- Most important 2-Much important 3- Important 4- Less important 5- Least important

S.N.	Strength Factor	1	2	3	4	5
S <sub>1</sub> .	Flexibility					
S <sub>2</sub> .	Inexpensive labour					
S <sub>3</sub> .	Closeness to market					
S <sub>4</sub> .	Owners management					
S <sub>5</sub> .	Less overhead					
S <sub>6</sub> .	Co- operation from employees					
S <sub>7</sub> .	Favorable capital output ratio					
S <sub>8</sub> .	Flat management structure					
S <sub>9</sub> .	Any other, please specify.					

- B. The weaknesses of SMEs are given below. Please give them number from 1-5 according to their severity in affecting the performance of your plant. (Please tick '√' in the appropriate column)

1- Most affecting                      2-Much affecting                      3- Affecting  
 4- Less affecting                      5- Least affecting

S.N.	Weakness Factor	1	2	3	4	5
W <sub>1</sub> .	Lack of technology superiority					
W <sub>2</sub> .	Lack of planning					
W <sub>3</sub> .	Lack of quality consciousness					
W <sub>4</sub> .	Lack of financial strength					
W <sub>5</sub> .	Lack of infrastructure facilities					
W <sub>6</sub> .	Underutilization of capacity					
W <sub>7</sub> .	Management deficiency					
W <sub>8</sub> .	Inadequate attention to R & D					
W <sub>9</sub> .	Retention of key personnel					
W <sub>10</sub> .	Lack of long term strategic focus					
W <sub>11</sub> .	High percentage of absenteeism					
W <sub>12</sub> .	Lack of trained workers					
W <sub>13</sub> .	Lack of quality work culture					
W <sub>14</sub> .	Any other, please specify.					

C. The Opportunities to SMEs are given below. Please give them number from 1-5 according to their importance. (Please tick '√' in the appropriate column)

1- Most affecting                      2-Much affecting                      3- Affecting  
4- Less affecting                      5- Least affecting

S.N.	Opportunities Factor	1	2	3	4	5
O <sub>1</sub> .	Reservations of products items by Govt.					
O <sub>2</sub> .	Ancillarisation to large businesses					
O <sub>3</sub> .	Incentives					
O <sub>4</sub> .	Export market					
O <sub>5</sub> .	Govt. support.					
O <sub>6</sub> .	Any other, please specify.					

D. The threats to SMEs are given below. Please give them number from 1-5 according to their severity. (Please tick '√' in the appropriate column)

1- Most affecting                      2-Much affecting                      3- Affecting  
4- Less affecting                      5- Least affecting

S.N.	Threat Factor	1	2	3	4	5
T <sub>1</sub> .	Competition from large and multinational business					
T <sub>2</sub> .	Technological obsolescence					
T <sub>3</sub> .	Increase in input price like power, raw material etc.					
T <sub>4</sub> .	Socioeconomic environment					
T <sub>5</sub> .	Negligence towards industrial training					
T <sub>6</sub> .	Financial stringency					
T <sub>7</sub> .	Any other, please specify.					

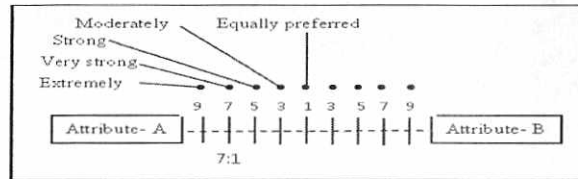
E. The environmental factors are given below. Please give them number from 1-5 according to their role in affecting the performance of your plant. (Please tick '√' in the appropriate column)

1- Most affecting                      2-Much affecting                      3- Affecting  
4- Less affecting                      5- Least affecting

S.N.	Environmental Factor	1	2	3	4	5
E <sub>1</sub> .	Competition from large and multinationals					
E <sub>2</sub> .	Govt. support (financial and non- financial)					
E <sub>3</sub> .	Rise in expectation of customer					
E <sub>4</sub> .	Shortage of raw material					
E <sub>5</sub> .	Export market					
E <sub>6</sub> .	Ancillarisation to large industry					
E <sub>7</sub> .	Political will and stability					
E <sub>8</sub> .	Any other, please specify:-					

**AHP Analysis**

For Example - An assumption is that if the decision maker considers the importance of attribute 'A' as very strong than attribute 'B', it is rated at 7.



Que.7. Compare the attributes of the AHP Model by giving the degree of performance in the appropriate box of table.

UD	SP	UQ	IA	CN	RW	FI	VA	TI	CA	OP	TP
	SP										
		UQ									
			IA								
				CN							
					RW						
						FI					
							VA				
								TI			
									CA		
										OP	
											TP

(List of Attributes and Sub attributes are enclosed herewith)

Name & Signature: \_\_\_\_\_  
 Designation : \_\_\_\_\_  
 Qualification & Experience of Respondent: \_\_\_\_\_  
 Name of Plant : \_\_\_\_\_  
 Address : \_\_\_\_\_

**List of Attributes and Sub attributes**

<b>Attributes</b>	<b>Sub-attributes (For Explanation Purpose)</b>		
Use of team process (TP)	Number of team activities	Effectiveness of team process	Outcomes of team activities
Focus on internal customer (FI)	Staff, aware of the concept of internal customer	Quality service received from their internal suppliers	Awareness program conducted for internal customer
Emphasis on the use of data (UD)	Employee trained in use of data	Application of data	Evidence of impact of variation on decision made
Common understanding of quality (UQ)	Staff aware of the concept of quality	Understand and express customers needs	Training programs conducted for understanding of quality
Understanding of customer need (CN)	Ability to express customer needs	Budget spent on identifying customer need	Training program conducted for understanding customer need
Supplier partnership (SP)	Help rendered to supplier	Supplier continued	Seminar organized
Understanding of the organizational process (OP)	Documentation of Process	Awareness of documentation understanding process	Knowledge of undocumented features of processes
Understanding of Techniques of improvements (TI)	Application of various tech.	Training in use of various tech.	Staff trained for new tech.
Improvement ability (IA)	Improvements in customer satisfaction through new technique		Improvement Evidence
Customer need fulfillment ability (CA)	Cost of warranty	Customer complaints solved	Rise in sale
Variability reduction ability of product to provide reliability (VA)	Evidences of reduced variation and increased reliability	Effect of reduce variation on volume of sale	Effect of reduce variation on machine utilization
Ability to reduce waste (RW)	Evidences in reduction of waste	Cost of Quality	Cost saving through reduced waste

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