

DEVELOPMENT OF A FRAME WORK FOR CONTINUOUS IMPROVEMENT FOR SMALL SCALE MANUFACTURING INDUSRTY

¹Vidya A Telrandhe and ²Dr. Vinod S. Gorantiwar

¹Research Scholar, Rajiv Gandhi College of Engineering, Research & Technology, Chandrapur (M.S.)
Email:telrandhesonal91@gmail.com

²Professor and head of the Mechanical Engineering Department, Rajiv Gandhi College of Engineering,
Research & Technology, Chandrapur (M.S.), Email:vinodsg@hotmail.com

Abstract

Total Quality Management (TQM) is a management philosophy, diffused all over the world, with the objective of improving the business performance of the organizations, by offering a systemic approach to continually improve the operative activities in order to fulfils customers' requirements. Quality & Productivity (Q & P) have become synonymous with the organizations performance excellence. Quality revolution is therefore very important & considered to be the most important one. TQM essentially has an important role in improving the performance of the organization. However, small scale manufacturing industries play an important role in Indian economy. Therefore quality management implementation is the very important tool. The literature review has justified that no study has yet statically elaborated the need for implementation of TQM strategies for Q & P improvement in small scale manufacturing industries. In context of this the attempt was made to cease the gap through identification of Critical Success Factors (CSFs), Performance Measurement Factors (PMFs), followed by judgmental grouping, development of instrument, pilot survey for industries in Vidharbha region.

Keywords- CSFs; PMFs; small scale manufacturing industry; instrument.

1. Introduction

Small scale industries help the economy in promoting balanced development of industries across all the regions of the economy. Small scale industries are adept in distributing national income in more efficient and equitable manner among the various participants in the process of good production than their medium or larger counterparts. The small-scale industries

sector plays a vital role in the growth of the country. It contributes almost 40% of the gross industrial value added in the Indian economy. Chauhan, George & jani (2013)

It has been estimated that a million of investment in fixed assets in the small scale sector. The small scale sector has grown rapidly over the years. The growth rates during the various plan periods have been very impressive. In India the number of small scale units has increased from an estimated 0.87 million units in the year 1980-81 to over 3 million in the year 2000. When the performance of this sector is viewed against the growth in the manufacturing and the industry sector as a whole, it instills confidence in the resilience of the small-scale sector. A small scale unit is normally a one man show and even in case of partnership the activities are mainly carried out by the active partner and the rest are generally sleeping partners. These units are managed in a personalized fashion. The owner is activity involved in all the decisions concerning business. The area of operation of small units is generally localized catering to the local or regional demand. The overall resources at the disposal of small scale units are limited and as a result of this, it is forced to confine its activities to the local level. Small industries are fairly labor intensive with comparatively smaller capital investment than the larger units. Therefore, these units are more suited for economics where capital is scarce and there is abundant supply of labor.

2. Identification of the Gap

Research gaps were identified through – a) Visits to small scale manufacturing industries, b) Discussion with different level employees of small scale manufacturing industries, c) Exhaustive literature review on small scale manufacturing industries, d) Extensive literature review on critical success factors, e) Extensive literature review on PMFs etc. Gap identification needs literature review of the number of the researches done before with respect the subject under the study. Through extensive literature review it was revealed that the study for model development for small scale manufacturing industry based on statistical analysis was not undergone till date. Presented literature until now deals mostly with the generalized area such as manufacturing industry, service sectors, Construction Projects etc. Survey based models were developed by many researchers; few of them (Gunasekaran et al. 1993; Sahu, 2007; Gorantiwar & Kshirsagar, 2011) have developed mathematical models, few others (Jose et. al., 2004, Lewis et. al., 2007, Zaheer, et. al., 2010, Udayangani, et.al., 2011 Koilakuntla, et. al., 2012, Talib, et. al., 2013) have developed conceptual model while others (Chang, 2005) have gone for case study in the area of quality management. Table 1 summarizes instrument development studies, their author/s, and objective of instrument development,

country & type of industry where the study was carried out. The gap identification is further mentioned below in detail Refer Table 1.

Table 1: Purpose of instrument development, their Researchers, country/Area & type of industry / sector

Year	Researchers	Purpose of instrument development or research	Country / Area	Type of Company/ sector
2004	Jose et. al.	To Develop a measure to assess Quality Management in Certified firms.	Spain	Manufacturing
2006	Shrivastava et al.	To develop CSFs for Indian Industry	India	Manufacturing
2008	Salaheldin	To find out CSFs for TQM implementation & their impact on performance of SMEs	Qatar	SMEs
2010	Nitu & Feder	The determination of factors with the highest impact on export performance of various enterprises	Romania	Manufacturing
2010	Faisal	The relationship between total quality management and quality performance	India	Service industry
2012	Asawin Pasutham	To develop and to apply an integrated supply chain performance	Thailand	Case Studies of Thai Manufacturers, Thailand
2012	Koilakuntla, et. al.	To design and develop a model by which one can estimate their industry specific factor weight-ages for each factor with Respect to selected Key performance indicators (KPIs)	India	Manufacturing
2013	Sahu et al.	To measure the critical success factors of technical education via TQM approach	India	Technical Institutes

2014	Redha Elhuni	A Framework for successful TQM implementation and its effect on the organizational sustainability development	UK	Oil sector
2014	Shrivastava	Critical success factor for cement industry	India	A case study Cement industry

3. Literature Review

For the present research, extensive literature review was carried out from variety of sources. Table 2 summarizes all such sources with their numbers. However, literature collection and analysis is a continuous process and therefore summary of analyses literature changes with time.

Table 2: Summary of analyzed literature

Sr. No.	Source	No.
01	Articles from international journals	21
02	Articles from international and national conferences and seminars	11
03	Web sites	06
04	Technical Magazines	03
05	Technical Reports	04
06	M. Tech. and Ph.D. theses	02
TOTAL		47

3.1 CSFs Identified through Literature Review

CSF is a management term for an element that is necessary for an organization or project to achieve its mission. It is a critical factor or activity required for ensuring the success of a company or an organization. Many authors have defined and described CSFs in their research papers. Rockart (1979) defined the CSFs as “the areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization”. Boynton et.al. (1984) define "CFS is those few things that must go well to ensure success for a manager or an organization, and therefore, they represent those managerial or enterprise area, that must be given special and continual attention to bring about high performance” Saraph et.al. (1989) defined the CSFs as “the critical areas of managerial planning and action that must be practiced in order to achieve the effectiveness”. Ahire et.al. (1996) mentioned in his work that “CSFs of

TQM are latent variables, which means they cannot be measured directly”. Wali et.al. (2000) described CSFs as few arching requirements that must be present for an organization to be able to attain its vision and to be guided towards the vision they provide an early warning system for management and a way to avoid surprises or missed opportunities”. CSF can tap the intuition of a good manager and make it available to guide & direct the organization toward accomplishing its mission. Caralli et. al. (2004), Karuppusami and Gandhinathan (2006) opine that, “CSFs are essential constructs based on which further statistical analysis can be carried out”.Desai et.al. (2011) expressed, It is essential that the organizations identify key CSFs, which should be given special attention for ensuring the quality and productivity improvement. Hence it is found that the concept of CSFs is given a special attention for the research work. The problems which were found in quality area in general manufacturing industries had been checked and tried to correct by using CSFs.

Table 3: CSFs Identified Through Literature Review

CSFs	References
Training and Education	GPNQA (no date), IMCRBNQA (no date), Saraph et.al. (1989), Joseph et. al. (1999), Yusof and Aspinwali (1999),Umble et.al.(2003), Jewels et.al.(2005), Sternad and Bobek(2006), Salaheldin (2008), Salaheldin(2009), Evangelista et.al.(2010), Rohani et.al.(2010), Talib et.al(2010), Maleki and Beikkhakhian (2011),Nee et.al. (2011), Singh and Sarode (2011), Gherbal et. al. (2012), Sahu et. al. (2013), Gorantiwar and Shrivastava (2014).
Employee Involvement	EFQM (no date),GPNQA (no date), IMCRBNQA (no date, MBNQA (no date), Badri et. al. (1995),Saraph et. al. (1989), Yang (2004),Dilbar et.al.(2005), Cheng and Choy(2007), Salaheldin et.al.(2009), Rohani et.al.(2010),Talib et.al.(2010), Singh and Sarode (2011) ,Nee (2011), Bourson et.al.(2012), Chong et.al.(2012), Gorantiwar and Shrivastava (2014)..
Organizational Culture	Joseph et. al. (1999), Oakland et. al.(2000),Nah et.al (2001) Umble et.al.(2003), Umble et.al.(2003), Jewels et.al.(2005), Cheng and Choy(2007), Chetcuti (2008), Rohani et.al.(2010), Nee (2011), Gherbal et.al(2012), Vinayan et.al.(2012), Gorantiwar and Shrivastava (2014)..
Continuous Improvement	Sila and Ebrahimpour (2003), Cheng and Choy (2007), Salaheldin et.al. (2008),Talib et.al. (2010), Singh and Sarode (2011), Sahu et. al. (2013).

Work Environment	Cheng and Choy (2007), Dilber et.al. (2005), Salaheldin (2009), Evangelista (2010), Nee (2011), Gherbal et al. (2012), Mehta (2013), Sahu et. al. (2013), Gorantiwar and Shrivastava (2014).
Technical adequacy	Gunasekaran(1999), Holland and Light (1999),Joseph et.al(1999),Nah et.al.(2001).
Customer focus	EFQM (no date), RGNQA (no date), IMCRBNQA (no date), GPNQA (no date), MBNQA (no date), Yusof and Aspinwali (1999), Shrivastava et. al. (2004) Putri and Yusof (2008), Salaheldin (2009),Talib et.al.(2010), Singh and Sarode(2011) , Gherbal et.al (2012),Chong(2012), Gorantiwar and Shrivastava (2014).
Quality Assurance	Saraph et.al (1989), Joseph et. al. (1999), Yusof and Aspinwali (1999), Sila and Ebrahimpour (2003), Ching and Choy (2005), Yang et.al. (2005), Salaheldin (2009), Rohani et.al. (2010), Talib et.al. (2010), Mehta (2013),Gorantiwar and Shrivastava (2014).

3.2 PMFs Identified through Literature Review

The factors responsible for improving the effectiveness of the project or performance in industries are the PMFs or effectiveness factors. Usually there exists a relationship between CSF's & PMF's more specifically CSF's are the input factors or independent variables and PMF's are the output factors or dependent variables. Saraph et. al., (1989), identified the eight CSFs in manufacturing Firms in U.S. and relates them with the factors such as financial performance, quality performance which are the effectiveness factors or performance measurement factors. Omran et. al., (2012) mentioned that research on the CSFs is considered to be a means to improve the effectiveness of the construction project and to achieve project objectives. A study done by Chittithaworn et. al. (2011) revealed that CSF's such as SMEs Characteristic, Customer and Markets, the way of doing Business & Cooperation, Resources and Finance, and External Environment have significant positive effect on the Business Success of SMEs which is the Performance Measurement factor. Pasutham (2012) elaborated Supplier performance, operational performance & environmental performance as the important effectiveness factors to develop and to apply an integrated supply chain performance measurement framework. As per Nagarajan, et. al. (2012) the term, knowledge management was coined by Karl Wiig in 1986 during a conference presentation in Switzerland. He stated that KM is a systematic, explicit and deliberate building, renewal and application of knowledge to maximize enterprises knowledge related effectiveness returns from its knowledge assets. Furthermore Valmohammadi (2010) identified and prioritize the importance of PMFs of

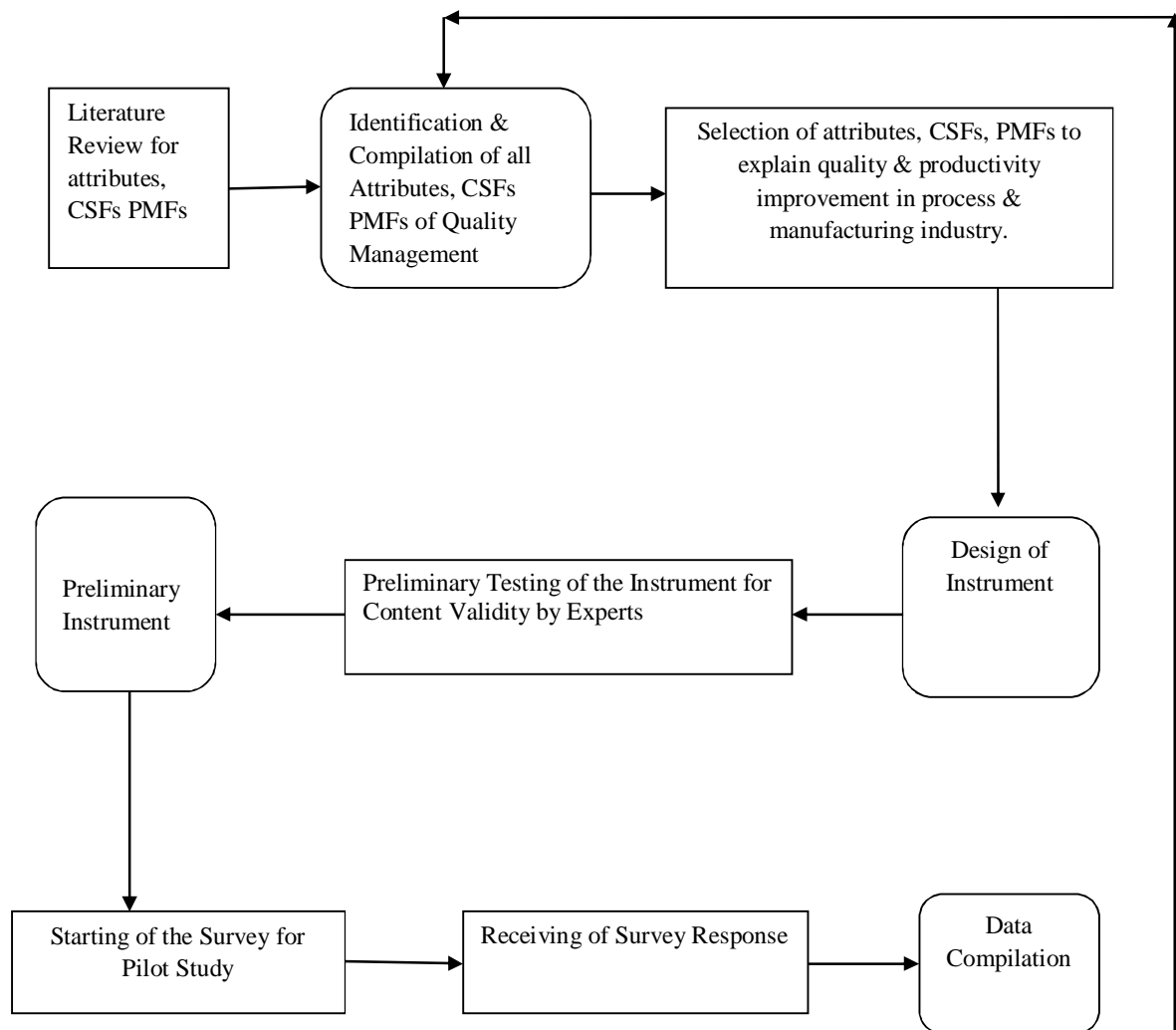
knowledge Management in Iranian SMEs. Calingo, (2002) does the study to promote quality awareness, to recognize quality achievements of companies, and to publicize successful quality strategies in productivity organizations in Japan under that he studies and lists Customer-Driven Excellence, Business Result, organizational performance, customer satisfaction, financial and marketplace performance, supplier and partner performance, and operational performance, customer confidence, process results, financial results as an important output factors. Based on the PMFs such as quality performance, customer satisfaction, employees performance, quality culture creation, business excellence Jose et. al. (2004) developed a measure to access Quality Management in certified firms.

Table 4: PMFs Identified Through Literature Review.

PMFs	Authors
Customer Satisfaction	EFQM (no date), RGNQA (no date), IMC RBNQA (no date), GPNQA (no date), MBNQA (no date), Deming prize (no date) Arumugam et. al., (2011), Fard & Mansor (2011), Kshirsagar & Gorantiwar (2011), Melia (2011), Asawin Pasutham (2012), Koilakunthla et. al., (2012), Talib et. al. (2013).
Employee Satisfaction	EFQM (no date), RGNQA (no date), IMC RBNQA (no date), Sila & Ebrahmpour (2003), Jose et. al., (2004), Milkavoch, et. al. (2004), Shrivastava et. al.(2004),Chang (2005), Singh, et. al. (2006), Lewis et. al. (2007), Kumar, et. al. (2008), Alonso & Fuentes, (2011), Kshirsagar & Gorantiwar, (2011), Melia (2011), Asawin Pasutham (2012), Talib et. al. (2013).
Financial Performance	Deming Prize (no date), EFQM (no date), RGNQA (no date), IMC RBNQA (no date), GPNQA (no date), MBNQA (no date), Saraph, et. al. (1989), Calingo (2002), Sila & Ebrahmpour (2003), Milkavoch et. al. (2004), Chang (2005), Kumar et. al. (2008), Vinuesa & Hoque (2011), Almajali et. al. (2012), Talib et. al. (2013).
Operational Performance	Deming Prize ([no date), EFQM([no date), RGNQA (no date), IMC RBNQA (no date), GPNQA(no date), MBNQA(no date), Calingo (2002), Sila & Ebrahmpour (2003), Milkavoch, et. al. (2004), Kumar, et.al. (2008), Salaheldin (2009), Arumugam, et. al. (2011), Bitzer et. al.(2011), Vinuesa & Hoque (2011), Asawin Pasutham (2012),Talib, et. al. (2013).

Quality Performance	Saraph, et. al. (1989), Anderson, et. al. (1997), Jose et. al. (2004), Dilber (2005), Kumar et.al. (2008), Fard & Mansor (2011) Vinuesa &Hoque (2011), Asawin Pasutham (2012) Rashmi & Swamy (2012), Munizu (2013), Talib et. al. (2013).
---------------------	---

4. Development of the Instrument Used for the Study



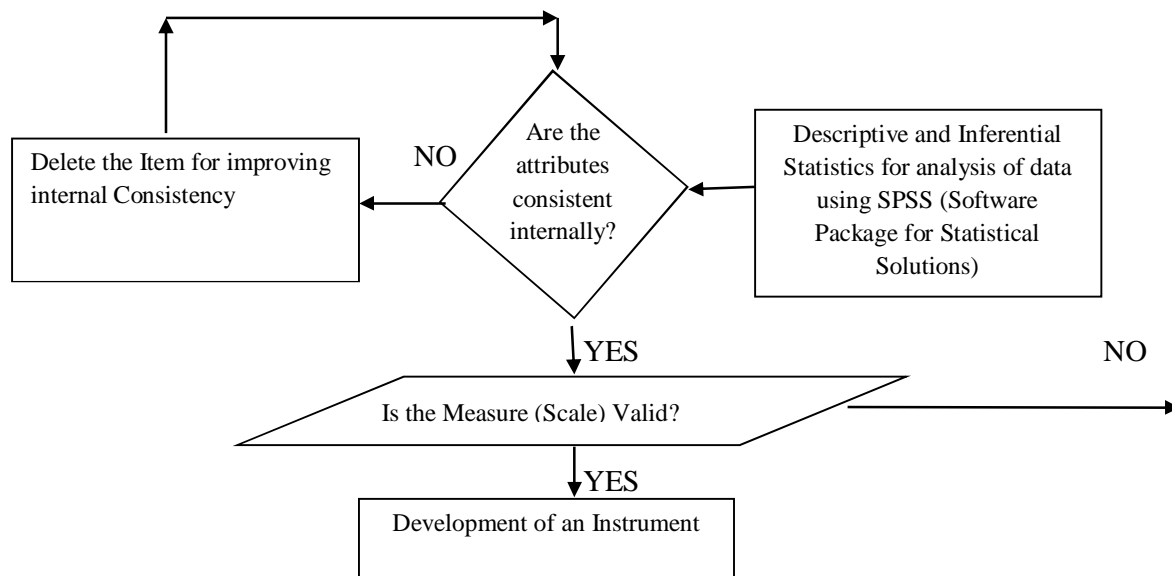


Fig.1: Instrument Development Process (Shrivastava, R.L. 2014)

5. Design of Instrument

The instrument essentially consists of five individual sections explained as follows

Section - I: Basic information about the respondent (Name, qualification etc.)

Section – II: Close ended questions for collection of the technical data about plant.

Section – III: Attributes on CSFs of Q & P in Small Scale Manufacturing Industry.

Section – IV: PMFs of Q & P Small Scale Manufacturing Industry.

Section – V: Open ended questions for exploration of the few more areas about Q & P.

Section-I comprises of the basic information about respondents, name of organization, contact details etc. Section II deals with the close ended questions to collect the technical information about the plant in brief. The collected data in this section is used for analysis of variance (ANOVA). Section III & Section IV has finalized various attributes for CSFs and PMFs respectively for Q & P improvement in small scale manufacturing industry. Now the choice was to decide whether to use 5 point likert scale or 3 point likert scale. As most of the authors used 5 point likert scale therefore 5 point likert scale was used and was convenient during the survey too. Section V was purely for open ended questions to uncover more ideas from respondents as applied to the domain. Due care was taken during the design of the instrument to make it respondent friendly.

Table 5: Scale Used by Various Authors

S. No.	Scale Used	Author
01	5 point Likert Scale	Saraph et. al. (1989); Talavera, (2004); Dilber et. al. (2005); Salaheldin, (2008); Angell et. al. (2009); Sahu et. al. (2011); Singh & Sarode, (2011).
02	7 Point Likert Scale	Das et al. (2008)

Initially, 26 attributes for the CSFs & 19 attributes for the PMFs were selected based on literature review, discussion with different small scale manufacturing industries employees, etc. Overall, it was judgmental process suitable for particular industry. The attributes were staggered in the instrument to avoid the bias of respondents. Table 6 and 7 below are the compilation of all these attributes for CSFs and PMFs respectively, which include the notions from all these sources.

Table 6: List of Attributes for the CSFs

Sr.No.	Attributes for input factors
1	Commitment of job security to employees.
2	Training programs on quality tool
3	Good knowledge of customer requirement
4	Customer feedback
5	Good economic, cultural & technological environment
6	Employees with team spirit
7	Improvement in job satisfaction level
8	Supporting infrastructure & location of the firm
9	Use of quality tools
10	Cooperative behavior
11	Increased employee adaption for changes
12	Change in product according to requirement
13	Continuous improvement through advance technology
14	Regular & efficient supply of raw materials.
15	Regular consideration of employee feedback.
16	Efficient tools and techniques.
17	Good salary package

18	Employee education
19	Motivation programs
20	Good and healthy working environment
21	Safety of employees
22	Encouraging innovation in job
23	Job satisfaction/safety
24	Use of advance technology
25	Good communication
26	Employee commitment

Table7: List of Attributes for the PMFs

Sr.No.	Attributes for output factors
1	Higher customer satisfaction
2	Better safety to employees
3	Increase in Net Profit
4	Reduction in production cost & waste
5	Improved quality of products
6	Low customer complaints
7	High level of productivity of employees
8	Good product at competitive price
9	High process accuracy rate
10	Low cost of quality
11	Improvement in job satisfaction to employees
12	Optimum capital utilization
13	Less work in process
14	Flexibility of operation
15	Higher employee satisfaction
16	Less number of defectives
17	Quality improvement in process
18	High level of flexibility in operations
19	Significant scrap reduction.

6. Collections of the Data

Once the instrument is ready, called as pre-instrument, the next step is to collect the data. The data was collected by personally contacting the small scale unit employees. Before the start of data collection, the respondents were educated by explaining the aim of the work and their queries were answered.

6.1 Industry Profile

Three small scale manufacturing industries located in Wardha (M.S.) were used for pilot study and 25 numbers of employees were used as the respondents. Industrial profiles used for Pilot Study are described below.

Table 8: Profiles of the industry selected for the study

Industry	Investment	Work Force	Age of Company
01	Between 1-5 lakh	Above 5	More than 5 years
02	Above 10 lakh	Between 5-10	More than 5 years
03	Above 10 lakh	Over 10	More than 5 years

6.2 Profile of the Respondents

The next Step for the Pilot study was to collect the data for the instrument from the respondents. The respondents used were contacted personnel few of the respondents refuse to response and did not respond correctly and as a result 25 responses were sorted out to be used for the pilot study. Therefore responses were 100%. To find out the response rate for the pilot study was the next step ahead, however none of the authors reported the response rates in the literature for the Pilot Study done by them. Table 9, fig. 2 mentions the profile based on experience of the respondents.

Table 9: Profile of the Respondents

Experience based Respondents	
Experience between 10 to 25 years	11
Experience between 6 to 9 years.	5
Experience up to 5 years	9
Total	25

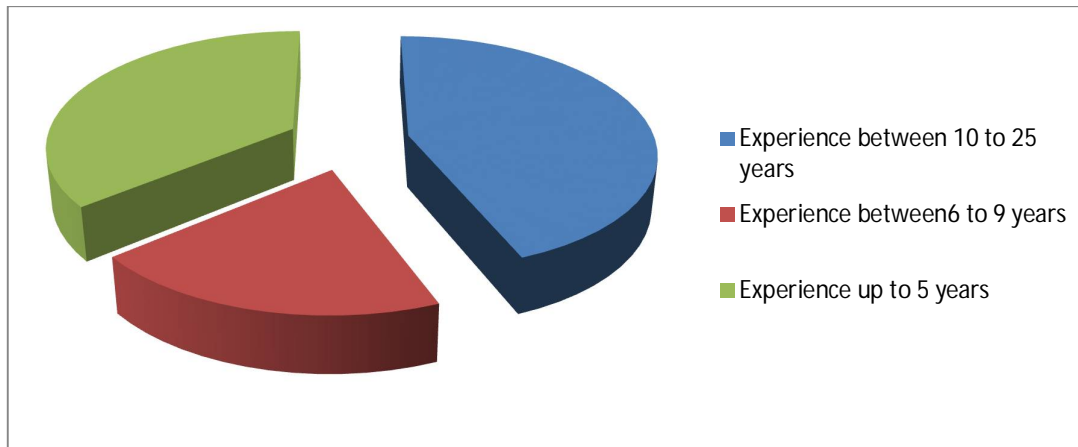


Fig.2: Pie chart showing the respondents profile based on their experience

6.3 Analysis of the data

The data is to be then analyzed using descriptive & inferential Statistics.

6.4 Software used for Analysis

Selection of the suitable and convenient software was the next task ahead. There are much software that could be used for analysis such as SPSS, LISREL, SAS, Microsoft Excel etc. Though SPSS V20 (Software Package for Statistical Solutions) was used for the pilot study because of the convenience & good accessibility. The above mentioned software's were used by different authors tabulated ahead.

Table 10: Software used by various Authors for Analysis

S No.	Software used	References
01	SPSS	Saraph et al., (1989); Final Report for RMC, (2003); Digalwar & Sangwan, (2007); Lam et al.,(2008) Agus et al., (2009); Singh & Sarode, (2011).

6.5 Cronbach Alpha for Reliability Analysis

Entire instrument is then analyzed for Reliability by finding out Cronbachs alpha. It assists one to delete the irrelevant items. The items Resulting in Cronbachs alpha less than 0.7 are the irrelevant items and should be deleted (Nunally, 1978). And the resulting cronbachs

alpha for the output factors was 0.702 which indicates the reliability of the instrument. Therefore it allows the instrument to be considered for main study. Table 13 & 14.

Table 11: Cronbachs alpha for IP Variables

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.832	.835	26

Table 12: Cronbachs alpha for OP Variables

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.858	.854	19

Table13: Item Total Statistics for IP Variables

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	96.5200	100.510	.235	.831
2	97.1600	99.307	.246	.831
3	96.2000	102.417	.194	.831
4	95.9600	103.540	.055	.837
5	96.4400	95.090	.467	.822
6	96.2800	100.710	.168	.835
7	96.6000	99.417	.378	.826
8	96.5200	96.260	.393	.825
9	96.4400	100.257	.196	.833
10	95.8800	100.027	.334	.828
11	96.6400	95.573	.400	.825
12	96.4400	102.340	.147	.833
13	96.4800	95.677	.478	.822
14	96.0400	100.957	.238	.831
15	96.5600	97.673	.355	.827
16	96.5200	97.343	.377	.826
17	96.0800	93.993	.597	.817
18	96.5200	93.427	.570	.818
19	96.6400	89.990	.570	.816

20	96.3200	99.143	.362	.827
21	96.2000	99.750	.334	.828
22	96.6400	93.157	.462	.822
23	96.2400	97.023	.609	.820
24	96.3600	95.990	.459	.823
25	96.1600	97.723	.424	.824
26	96.1600	98.307	.510	.823

Table 14: Item Total Statistics for OP Variables

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1	75.4000	54.583	.287	.857
2	75.4400	51.507	.564	.847
3	75.4400	51.340	.531	.848
4	75.4800	48.177	.692	.839
5	75.4800	51.927	.525	.848
6	75.4400	55.090	.323	.856
7	75.6800	51.893	.482	.850
8	75.7200	54.043	.241	.861
9	75.8400	56.723	.074	.864
10	75.8400	51.307	.446	.852
11	75.7200	48.377	.688	.840
12	75.7200	53.460	.289	.859
13	75.8000	49.417	.674	.841
14	75.9600	51.540	.519	.848
15	75.8000	53.917	.367	.854
16	75.6800	53.060	.409	.853
17	76.0000	50.250	.680	.842
18	75.8000	51.667	.556	.847
19	75.6000	54.750	.228	.860

6.6 Open Ended Questions Analysis

The analysis of the open ended questions results in gaining of few additional things from respondents regarding Q & P improvement in small scale manufacturing industry. That's why open ended questions were analyzed and as a result the one important attribute regarding

small scale manufacturing industry was gathered. Consequently it was added into the attributes for CSFs in the main Instrument.

Finally table 15 & 16 summarizes the final instrument to be used for main study.

Table15: Final Instrument IP Variables

Sr.No.	Attributes for input factors
1	Commitment of job security to employees.
2	Training programs on quality tool
3	Good knowledge of customer requirement
4	Customer feedback
5	Good economic, technological & healthy working environment
6	Encouraging teamwork
7	Improvement in job satisfaction level
8	Supporting infrastructure & location of the firm
9	Use of quality tools
10	Cooperative behavior
11	Increased employee involvement for changes
12	Change in product according to requirement
13	Continuous improvement through advance technology
14	Regular & efficient supply of raw materials.
15	Regular consideration of employee feedback.
16	Efficient tools and techniques.
17	Good salary package
18	Employee education
19	Motivation programs
20	Safety of employees
21	Job satisfaction/safety
22	Use of advance technology
23	Good communication
24	Innovation and improvement technique

Table 16: Final Instrument OP Variables

Sr.No.	Attributes for output factors
1	Higher customer satisfaction
2	Better safety to employees
3	Increase in Net Profit
4	Reduction in production cost & waste
5	Improved quality of products
6	Low customer complaints
7	High level of productivity of employees
8	Good product at competitive price
9	High process accuracy rate
10	Low cost of quality
11	Improvement in job satisfaction to employees
12	Optimum capital utilization
13	Less work in process
14	Improved quality of the process
15	Higher employee satisfaction
16	Less number of defectives
17	Increase in employee efficiency
18	High level of flexibility in operations
19	Significant scrap reduction.
20	Higher human resource utilization

7. Discussion

Instrument development & validation process is very much critical & important. The attributes of the PMFs varies industry wise therefore identification of correct attributes is very much critical process. TQM is the term signifying the involvement among all the employees of all hierarchical level. TQM is both a philosophy and a set of guiding principles that represents the foundation of a continuously improving organization. The study has effectively identified the Performance measurement factors & their attributes by the extensive literature review method and elaborated their importance as applied to the various manufacturing firms. The study could definitely serve as a guide for business consultants and analyst for deciding the decision making parameters for successful implementation of the TQM. The instrument developed here from pilot

survey of small region; but every care must be taken to make it generalized for main study. Thus, the instrument so developed should be universally accepted for small industries. . The literature review has justified that no study has yet statically elaborated the need for implementation of TQM strategies for Q & P improvement in small scale manufacturing industries. In context of this the attempt was made to cease the gap through identification of CSFs, PMFs, followed by judgmental grouping, development of instrument, pilot survey for industries in Vidharbha region.

References

- Agus, A., Ahmad, M. S. and Muhammad, J. (2009) 'An empirical investigation on the impact of quality management on productivity and profitability: Associations and Mediating Effect', *Contemporary Management Research*, Vol. 5, No. 1, pp.77-92.
- Angell, L.C. and Corbett, L.M. (2009) 'The quest for business excellence: evidence from New Zealand's award winners', *International Journal of Quality & Reliability Management*, Vol. 29, No. 2, pp.129-149.
- Almajali, A., Almrao, S. & Al-Soub, Y. (2012) 'Factors Affecting The Financial Performance of Jordanian Insurance Companies Listed At Amman Stock Exchange', *Journal of Management Research*, Vol. 4, No. 2, pp.266-289.
- Alonso, M., & Fuentes, V. (2011) 'International quality awards and excellence quality models around the world. A multidimensional analysis', *Springer Science Business Media B.V.*, Vol.10, No.7, pp.1-28.
- Arumugam, V., Mojtahedzadeh, R. & Malarvizhi, C. (2011) 'Critical Success Factors of Total Quality Management and their impact on Performance of Iranian Automotive Industry', *International Conference on Innovation, Management and Service*, Vol. 14, No. 2, pp.312-316.
- Calingo, L. R. (2002) 'The Quest for Global Competitiveness through National Quality and Business Excellence Awards', *Asian Productivity Organization*, Vol. 7, No.5, pp.05-176.
- Chang, H. (2005) 'The Influence of Continuous Improvement and Performance Factors in Total Quality Organization', *Total Quality Management*, Vol. 16, No. 3, pp.413-437.
- Chauhan, Y., George, P.M. (2014) 'Lack of Popularity of TQM in SMEs – A Few Obstacle', *International journal of engineering and technology*, vol.3issue 3 pp.1669-1673.
- Choi, T. Y. and Eboch, K. (1998) 'The TQM paradox: relations among TQM practices, plant performance, and customer satisfaction', *Journal of Operations Management*, Vol.17, pp.59-75.
- Das, A., Paul, H. and Swierczek, F.W. (2008) 'Developing & validating total quality management (TQM) constructs in the context of Thailand's manufacturing industry', *Benchmarking: An International Journal*, Vol.15, No.1, pp.52-72.
- Digalwar, A.K. and Sangwan, K. S. (2007) 'Development and validation of performance measures for world class manufacturing practices in India', *Journal of Advanced Manufacturing Systems*, Vol.6, No.1, pp.21-38.
- Dilber, M., Bayyurt, N., Zaim, S. & Tarim, M. (2005) 'Critical Factors of Total Quality Management and its Effect on Performance in Health Care Industry', *Problems and Perspective in Management*, Vol. 4, No. 3, pp.220-235.
- Fard, F. & Mansor, N. Mohamed, A. (2011) 'The Critical Success Factors of Performance Measurement for Malaysian SMEs in Manufacturing Sectors: A Proposed Framework', 2nd International Conference on Business Economic Research, Vol. 2, No. 5, pp.2660-2686.
- Final Report for RMC, (2003) 'Total quality management (TQM) advancement and critical success factors for implementation in manufacturing small & medium sized enterprise(SMEs)', [online] <http://eprints.utm.my/2626/1/71663.pdf> (Accessed 10 November 2012).
- Fening, F.A. (2012) 'Impact of Quality Management Practices on the Performance and Growth of Small and Medium Sized Enterprises (SMEs) in Ghana', *International Journal of Business and Social Science*, Vol. 3, No.13, pp.1-13.

- Gorantiwar, V.S., Kshirsagar, V.P. and Shrivastava, R.L. (2011) 'Quality and productivity in direct reduced iron industry and factors affecting it', *Proceedings of the International Conference on Sustainable Manufacturing: Issues, Trends and Practices (ICSM – 2011)*, 10-12 November 2011, BITS, Pilani, India, pp.303-312.
- Gorantiwar, V.S. and Shrivastava, R.L. (2014) 'Identification of critical success factors for quality-productivity management approach in different industries', *International Journal of Productivity and Quality Management*, Vol. 14, No. 1, pp.66-106.
- Gunasekaran, A., Goyal, S.K., Martikainen, T. and Yli-Olli, P. (1993) 'Determining economic inventory policies in a multi-stage just-in-time production system', *International Journal of Production Economics*. Vol.30-31, pp.531-542.
- Gunasekaran, A., Patel, C. and McGaughey, R.E. (2004) 'A framework for supply chain performance measurement', *International Journal of Production Economics*, Vol.87, pp.333-347.
- Jose, C., Juan, L. & Jose, T. (2004) 'Development of A Measure To Assess Quality Management In Certified Firms', *European journal of operational research*, Vol. 156, No. 3, pp.683-697.
- Joseph, I. N., Rajendran, C. and Kamalanabhan, T.J. (1999) 'An instrument for measuring total quality management implementation in manufacturing-based business units in India', *International Journal of Production Research*, Vol.37, No.10, pp.2201-2215.
- Koilakuntla, M., Patyal, V., Modgil, S. & Ekkuluri, P. (2012) 'A Research study on Estimation of TQM Factor Ratings through Analytical Hierarchy Process', *Procidia Economics and finance Emerging Market Queries in Finance and Business*, Vol. 12, No. 7, pp.55-61.
- Kshirsagar, V.P. (2012) 'Computer aided quality and productivity improvement in sponge iron industry', *M Tech thesis*, Rashtrasant Tukdoji Maharaj Nagpur University, India.
- Kumar, V., Choisine, F., Grosbois, D. & Kumar, U. (2008) 'Impact of TQM on Companies Performance', *International Journal of Quality and Reliability Management*, Vol. 26, No. 1, pp.23-37.
- Jung, J. Y., Wang, Y. J., and Wu, S. (2009) 'Competitive Strategy, TQM practice, and continuous improvement of international project management', *International Journal of Quality & Reliability Management*, Vol.26, No.2, pp.164-183.
- Lam, M.Y., Poon, G.K.K. and Chin, K.S. (2008) 'An organizational learning model for vocational education in the context of TQM culture' *International Journal of Quality & Reliability Management*, Vol.25, No.3, pp. 238-255.
- Lewis, W., Pun, K., & Lalla, T. (2007) 'Measuring employees perception in small and medium-sized enterprises: A self-assessment scale', *International Journal of Management Science and Engineering Management*, Vol. 2, No. 3, pp. 229-238.
- Milakovich, M. E. (2004), 'Rewarding Quality and Innovation: Awards, Charters, and International Standards as Catalysts for Change'. *Knowledge Management in Electronic Government-Springer Berlin heidelberg*, Vol. 3, No. 6, pp.80-90.
- Melia, D. (2011) 'Critical Success Factors and Performance Management and Measurement: Hospitality Context', Dublin Institute of Technology, Vol. 8, no.7, pp.1-19.
- Munizu, M. (2013) 'Total Quality Management (TQM) Practices towards Product Quality Performance: case at Food and Beverage Industry in Makassar, Inonesia', *IOSR Journal of Business and Management*, Vol. 9, No. 2, pp.55-61.
- Nitu, A. & Feder, S. (2010) 'Study Regarding the Influencing Factors of the Romanian Small and Medium Sized Enterprises Internationalization Process' *Theoretical and Applied Economics*, Vol. XVII, No. 1, pp.17-26.
- Nunally, J.C. (1978) *Psychometric theory*. Second edition, New York, McGraw-Hill.
- Pasutham, A. (2012) 'Supply Chain Performance Measurement Framework' *Case Studies on Thai Manufacturers Aston University Birmingham*, Vol. 5, No. 3, pp.1-365.
- Rashmi, S., & Swamy, D. (2013) 'Quality Management Practices in Rural and Urban SMEs In Bangalore City', *International Journal of Engineering and Management Research*, Vol. 2, No. 3, pp.13- 15.
- Roschmann, K. and Ziyadullaeva, M. (2011) 'Empirical Testing of Selected Critical Success Factors in CRM Implementation Projects, A Study of SMEs in the B2B Sector', *Master Thesis*, School of Sustainable Development of Society and Technology.

- Sahu, A. R., Shrivastava, R.R. and Shrivastava, R. L. (2007) 'A mathematical model to evaluate the effectiveness (quality) parameters towards excellence in technical education – a TQM approach', *National Conference on Recent Developments in Manufacturing & Quality management*, 5-6 October 2007, Chandigarh, India.
- Sahu, A. R., Shrivastava, R.R. and Shrivastava, R. L. (2011) 'An instrument for measuring the effectiveness towards excellence in technical education – TQM approach', *Proceedings of The International Conference on Industrial Engineering (ICIE-2011)*, 17-19 November 2011, Surat, India, pp.1057-1065.
- Sahu, A. R., Shrivastava, R.R., and Shrivastava, R. L.(2013) 'Development and validation of an instrument for measuring the critical success factors (CSFs) of technical education – TQM approach', *International Journal of Productivity and Quality Management*, Vol.11, No.1, pp.29-56.
- Shrivastav,R.L.,Ganguli,S.K. (2014) 'Critical Success Factor for Cemnet Industry in Indiya:A Case Study Analysis', *Internationam journal on core enggineeing and management*, vol.1,issue7,pp.79-99.
- Salaheldin, S. (2008) 'Critical Succes Factors for TQM Implementation and Their Impact on Performance Measurment', *Interantional Journal of Production and Performance Management*, Vol. 58, No. 3, pp.215-237.
- Saraph, J. V., Benson, P. G. and Schroeder R. G. (1989) 'An instrument for measuring the critical factors of quality management', *Decision Sciences*, Vol.20, pp.810-829.
- Seth, D. and Tripathi, D. (2005) 'Relationship between TQM and TPM implementation factors and business performance of manufacturing industry in Indian context', *International Journal of Quality & Reliability Management*, Vol.22, No.3, pp.256-277.
- Sila, I., & Ebrahimpour, M. (2003) 'Examination and Comparison of the Critical Factors of Total Quality Management (TQM) across Countries', *International Journal of Production Research*, Vol. 41, No. 2, pp.235-268.
- Singh, R., Garg, S., & Deshmukh, S. (2006) 'Competetivness Analysis of a Medium Scale Organization in India', *International Journal of Global Business and Competitiveness*, Vol. 2, No.1, pp.27-40.
- Singh, S.B., and Sarode, A.D. (2011) 'Development and validation of TQM constructs (in industries)', *Proceedings of the International Conference on Sustainable Manufacturing: Issues, Trends and Practices (ICSM – 2011)*, 10-12 November 2011, Pilani, India, pp.190-194.
- Shah, P.P. and Shrivastava, R.L. (2011) 'Development of an instrument for improving effectiveness of lean six sigma implementation in small and medium sized enterprises', *Proceedings of The International Conference on Industrial Engineering (ICIE-2011)*, 17-19 November 2011, Surat, India, pp.436-441.
- Shrivastava, R.L.,Mohanty, R.P. and Lakhe, R.R.(2006) 'Linkages between total quality management and organisational performance: an empirical study for Indian industry', *Production Planning & Control*, Vol.17, No.1, pp. 13-30.
- Talib, H., Ali, K. & Idris, F. (2013) 'Quality Management Frameworks for the SMEs Food Processing Industry in Malaysia', *International Food Research Journal*, Vol. 20, No. 1, pp.147-164.
- Talavera, M. (2004) 'Development and validation of TQM constructs', *Gadjah Mada International Journal of Business*, Vol.6, No.3, pp.335-381.
- Udayangani, K., Amaratunga, S. & Haigh, R. (2011), 'Structured approach to measure performance in Construction research & Development', *International Journal of Productivity & Performance Management*, Vol. 60, No. 3, pp.289-310.
- Vadde, S., and Srinivas, G. (2012), 'The Indian Steel Sector: Development and Potential'. *International Journal of Multidisciplinary Research*, Vol. 2 No. 1, pp.177-186.
- Vinuesa, L. & Hoque, Z. (2011) 'Total Quality Management, non-Financial Performance measures and business Performance', *An Empirical Study*, Vol. 13, No.9, pp.1-32.
- Wee, Y.S. and Quazi, H.A. (2005) 'Development & validation of critical factors of environmental management', *Industrial Management & Data Systems*, Vol.105, No.1, pp.96-114.
- Zaheer, A., Rehman, K. & Khan, M. (2010) 'Development and Testing of a Business Process Orientation Model to Impove Employee and organizational Performance', *African Journal of Business Management*, Vol. 4, No. 2, pp.149-161.