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A Comparative Study of Importance and Practices of CSFs of TQM Practices and Their Impact on Performance of North Karnataka SMEs Manufacturing Sectors: A Survey Result

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Abstract*— This paper aims is to identify and analyze critical success factors (CSFs) of implementation of Total Quality Management (TQM) in order to evaluate their impact on performance or business excellence of small and medium-sized manufacturing enterprises (SMEs) in the north Karnataka. In most countries, 95% of businesses that are established are SMEs. The paper adopts factor analysis approach comprising computation of the correlation matrix, communality factor matrix and rotation factors matrix. The investigated CSFs of TQM included leadership and top management commitment, vision and plan statement, supplier quality management, system process quality improvement, total employee involvement, education and training, performance appraisal and recognition, customer focus and satisfaction, evaluation, work environment and culture, continuous improvement, and communication. A questionnaire with 84 items in 12 CSFs was developed by the authors based on previous studies, checked for reliability and validity by experts and practitioners, and distributed to 950 SMEs in the north Karnataka SMEs with 31.05% valid response. The analysis revealed that there is a significant difference between the TQM perceived & practices of small and medium sized companies. The outcome of this paper will provide detailed review of CSF for organizations to consider when implementing quality measurements with suggestions on how to close the gap between perceptions of the importance and practices of CSFs in implementing TQM.

***Index Terms*— Total Quality Management, Small and Medium-Sized Manufacturing Enterprises, TQM Practices, Critical Success Factors, Business Excellence.**

I. INTRODUCTION

Total quality management 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. Many companies have arrived at the conclusion that effective TQM implementation will improve the competitive abilities and leads to business excellence (Anderson et.al., 1994, Powell, 1995)). Due to global competition, companies emphasized that quality should have to be put in place, integrated into all aspects of products and services within their management system. Hence, TQM has become increasingly popular as one of the managerial devices in ensuring continuous improvement so as to improve customer satisfaction and retention, as well as, to ensure its product or service quality. The purpose of this paper is to identify and analyze critical success factors (CSFs) of implantations of Total Quality Management (TQM) in order to evaluate their impact on business excellence of small and medium-sized manufacturing enterprises (SMEs) in the north Karnataka. As the result of a perception that smaller firms do not have the resources necessary to implement TQM effectively, a survey instrument was developed to evaluate perceptions of importance and actual practices of (CSFs) to implement TQM in Small and Medium Sized Manufacturing Enterprises (SMEs) of north Karnataka region.

II. TQM – WHAT IT MEANS

TQM is an approach to improving the effectiveness and flexibility of business as a whole. It is an essential way of organizing and involving the whole organization, every department every activity every single person at every level [Oakland (1989)]. Ishikawa (1985) defined TQM as a total systems approach, and an integral part of high level strategy which works horizontally across functions and departments, involving all employees, top to bottom, and extends backwards and forwards to include the supply chain and the customer chain. Boaden (1997), considers the importance of TQM for a number of reasons, viz., TQM is increasingly taught as an academic subject; there is broad based developing body of research on TQM; TQM and quality management are often confused; and evidence reading the 'success' of TQM is mixed. Feigenbaum (1993, 2001) defined it as a management approach that encourages everyone in the organization to focus exclusively upon serving the customer. Dean and Bomen (1994) defined quality management as approach to management comprising mutually supported principles, where each of them is supported by a set of practices and techniques. ISO 9000:2000 defined TQM as coordinated activities aimed at the control and direction of the organization towards quality (ISO, 2000).

Thus, it is visible from the various definitions that there is no unique definition of the TQM but there is a common

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thread of customer satisfaction and continuous improvement almost all definitions of TQM.

III. TQM & CRITICAL SUCCESS FACTORS

Although, TQM is a well-established field of study for business excellence the success rate of TQM implementation is not very high. The major reason for TQM failure is owing to the tendency to look at TQM as tool and not as a system. Critical success factors (CSFs) can be defined as "the critical areas which organization must accomplish to achieve its mission by examination and categorization of their impacts". Therefore, managers should understand what TQM is all about and the most important critical success factors that drive the successful implementations of TQM.

Several attempts have been made to review, study, identify, justify and evaluate the critical factors that constitute TQM strategy. As reported in the TQM literature, several review papers have been published by researchers such as, Saraph et al. (1989); Flynn et al. (1994); Anderson et al (1995); Powall (1995); Ahire et al.(1996); Black and Porter (1996); Tamimi and Sebastianelli (1998); Dow et al (1999); Joseph et al (1999); Khairul Anuar et al. (2001); Rahman(2001); Sureschandar et al. (2001); Li et al. (2003); Muhamad, Kamis and Jantan (2003); Sanchez-Rodriguez and Martinez-Lorente (2004); Kanji et al. (1999); and the most recent review of TQM literature is by Arawati (2005). The CSFs arealmost invariant across countries. Therefore, the leaders, policy makers and strategists, human resource managers, process managers, information managers, marketing and supply chain managers focus on certain factors of TQM, of course, with suitable adaptations. In this research study, the CSFs adapted are Leadership & Top Management Commitment (LTMC), Vision and Plan Statement(VPS), Supplier Quality Management (SQM), System Process Quality Improvement (SPQI), Total employee involvement (TEI), Education and Training(ET), Performance appraisal, Recognition(PAR), Customer Focus Satisfaction and(CFS), Evaluation (En), Work Environment and Culture (WEC), Continuous Improvement (CI), and Communication(Co), with a perspective on how to use critical factors as the foundation for driving transformational orientation in order to create a sustainable performance of business excellence.

IV. LITERATURE REVIEW

The essence of this literature review is to understand the impact of TQM on the business excellence of SMEs and potential reasons for TQM failures. In order to get a complete understanding of the theory and practice, various studies were analyzed and reviewed. Several key elements of TQM strategies have emerged in the literature from reported case studies, conceptual papers, and empirical research. For the present study, the researchers have included 12 critical factors dimensions from reviewing the TQM literature. They are: independent variables related to performance, namely, leadership and top management commitment, vision and plan statement, supplier quality management, system process quality improvement, total employee involvement, education and training, performance appraisal and recognition, customer focus and satisfaction, evaluation, work environment and culture, continuous improvement and communication. Pascoe, Larry Bruce (1992) in their study attempted to determine the level of importance placed on the key and important component of TQM, The effectiveness of the TQM programs and the degree of correlation between each of the critical factors of the effectiveness of the TQM programme. The study demonstrated that TQM programs were instrumental in enhancing the business excellence. Senior managers of the manufacturing organizations in USA participated in this research study. Sun (2000) has extensively investigated the relationship between TQM, ISO 9000 certifications, and business excellence through questionnaire. Cerio (2003) has reported that there existed a significant relationship between the levels of implementation of quality management principles and improvement in organized performance in terms of cost, quality and flexibility. The survey was conducted in Spanish firms. He concluded that, as the higher level of implementation of quality management practices increases it improves the organizational performance. The author also found that quality management practices, product design and development, were the most important significant predicts of operational performance.

Garvare and Isakassan (2001) suggested that many different concepts can be applied as measurements and indicators of sustainable development. They have proposed three categories of indicators such as driving forces, state reactive response and active response. They have concluded that excellence for sustainable development can be built on triangle i.e. person-organization- society. Oakland, (1994) and Clayton and Charles (1995) used hard and soft indicators to measure competitive achievement for business excellence. Hendricks and Singhal (1997, 1999) indicated that an effective TQM programme actually improved operating performance. Mann (1992) also agreed that TQM is not only a management tool for producing quality products and services, but also a process that leads to increased productivity and more favorable comparative position. He stressed that there is a relationship between quality and productivity. As quality improves there will be less rework or wastage, meanwhile customer satisfaction will be improved with this business excellence enhancement. Powell (1995) has investigated the possibility of incorporating TQM practice to gain and sustain competitive age. Drawing on the resources approach, his study examined TQM as potential source of sustainable competiveness. He found that organizations that put TQM practices in place outperform their competitors and among others, this finding suggested

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that financial performance was positively associated with quality management practices. Saraph et al., (1989) and Flynn et.al., (1994) proposed empirically validated empirical values of measures for integrated quality management aimed at providing better understanding of quality management practice in relation to an organization' quality environment and quality performance. Researchers have used such measures to understand quality management practice better and to build theories and models that relate the critical factors of quality management to organizational performance to achieve business excellence. Some claimed that successful implementation of TQM could generate improved products and services, reduced costs, produced more satisfied customers and employees and improve financial performance. Walton (1986), Garivin (1988) Piper, Randy, T. (1997) found that there was a significant and positive relationship between TQM and business excellence results. This research will therefore fill a gap in the existing literature by investigating fusible relationship between TQM practices and business excellence of small and medium sized manufacturing enterprises.

Total quality management (TQM) is an integrated management approach that aim to continuously improve the performance of products, processes, and services to achieve business excellence through customer's expectations. To accomplish this objective, some key factors that contribute to the success of TQM efforts are to be identified. These key factors are often termed as critical success factors (CSFs). An extensive review of literature on quality management was performed for the purpose of clarifying critical factors that are essential for TQM implementation. Through the extensive literature review, many critical success elements of TQM implementation are identified based on reviews of various models, Quality Awards, and conceptual frameworks of academics, practitioners along with empirical studies. From the literature review twelve critical success factors of TQM for effective quality management implementation were identified. It has been observed during literature review that most of the CSFs have similar description but are named with slight different name or labels.

V. THE SURVEY DETAILS

The objective of this study is to investigate the Analysis of Critical Success Factors (CSFs) of TQM practices in North Karnataka Small and Medium Sized Manufacturing Enterprise (SMEs). To that end, a survey questionnaire was developed. A total of twelve constructs were proposed, which were felt to be important for TQM implementation. For scoring purposes, a five-point Likert scale was employed with a score of 1= strongly disagree; 2=Disagree; 3= Neutral; 4= Agree; 5= strongly agree, for practice (The level of perceived importance to the factory) and 1= Not important at all; 2=Not important; 3= Neutral important; 4=Important; 5= very important for Importance (The level of perceived importance to the factory). Having validated the questionnaire through expert validation and pilot testing, a sample of 950 companies of small and medium enterprises in north Karnataka region, were randomly selected from the Directory of the north Karnataka small scale industries association (NKSSI) and the data base of the Karnataka Small and Medium Industry Development Corporation (KSMIDEC). The full survey, was undertaken through the mailed questionnaire, and personal visits to the some companies. Although the response rate was initially not encouraging, various techniques were used to improve the response rate including providing a stamped self-addressed envelope, and personalization (a hand-written note) on the covering letter in the follow-up stage. As a result, responses of 315 were received, out of which ten were incomplete, resulting in only 295 (48 medium and 247 small) responses being considered for final study, i.e. 31.05% valid response rate which the authors felt to be reasonable for this kind of study. The responses were analyzed using the SPSS Version 11.5 statistical package.

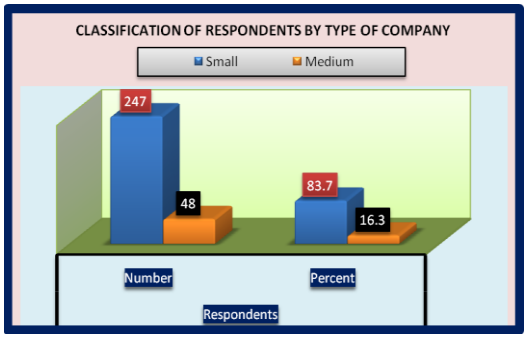
VI. SURVEY RESULTS

A. General profile of the company

Table 1 shows that the respondents of small and medium sized companies. Respondents from small-sized companies, defined in this study, the investment in plant and machinery is more than twenty five lakhs rupees but does not exceed rupees 5 cores. This is followed by medium-sized companies the investment in plant and machinery is more than rupees 5 cores but not exceeding Rs.10 cores. (Fig.1).

Table 1: Classification of Respondents by Type of Company
Source: Research Survey Data

Type of Company	Respondents	
	Number	Percent
Small	247	83.7
Medium	48	16.3
Combined	295	100.0



Source: Research Survey Data

Fig. 1: Classification of Respondents by Type of Company

Table 1 indicates the classification of respondents by type of companies. It is evident from the finding that higher percentage (83.7%) of small type of companies established as compared to 16.3% groups of industries focused as medium manufacturing enterprises.

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B. Aspect Wise Mean Response As Perceived On TQM Implementation: Small Company

Table 2 indicates the mean response as perceived on total quality management implementation in small companies. It is evident from the finding that the overall perception scores on Total Quality Management implementation in small companies found to be 88.0% and S D as 4.7%.

Table2. Aspect Wise Mean Response As Perceived On TQM Implementation: Small N=247

No.	Aspects of TQM	Statements	Max. Score	Respondents Perceived			
				Mean	Mean (%)	SD (%)	Avg. Mean
F1	LTMC	7	35	30.7	87.9	4.4	4.39
F2	VPS	7	35	30.3	86.6	4.8	4.33
F3	SQM	6	30	26.6	88.7	6.5	4.44
F4	SPQI	6	30	26.5	88.2	6.7	4.41
F5	TEI	7	35	30.3	86.5	6.2	4.32
F6	ET	7	35	30.0	88.6	6.3	4.43
F7	PAR	7	35	30.8	88.1	6.1	4.41
F8	CFS	7	35	30.8	87.9	5.1	4.40
F9	En	9	45	39.8	88.4	5.7	4.42
F10	WEC	9	45	39.8	88.4	6.9	4.43
F11	CI	7	35	30.6	87.5	6.7	4.38
F12	Co	5	25	22.3	89.1	7.2	4.15
	Combined	84	420	369.6	88.0	4.7	4.40
	ANOVA TEST RESULTS			1334.02*			

* Significant at 5 % Level

Source: Research Survey Data

Further the response on perception is found to be higher in communication (89.1%), followed by Supplier quality management (88.7%), Education and Training (88.6%), Evaluation (88.4%). On other hand perception on Total Quality Management implementation among small manufacturing enterprises groups found with Total employee involvement (86.5%), and Vision and plan statements (86.6%). Further, the statistical ANOVA result depicts the existence of significant difference in the perceived response between aspects under study.

C. Aspect Wise Mean Response As Perceived On TQM Implementation: Medium Company

Table 3 shows the mean response as perceived on total quality management implementation in medium companies. It is evident from the result that the overall mean response on perceived towards TQM is found to be 87.4 % with SD as 5.1%. The aspect wise response revealed that the highest percentage is in System Process Quality Improvement (89.0%), while Work Environment and culture (88.9%) followed by Performance appraisal, Recognition (88.5%), Evaluation (88.0%) and Continuous Improvement (87.5%) etc. show decreasing percentage.

However, the perceived response on Total Quality Management Implementation of medium companies is noticed that the Vision and plan statements (85.5%) and total employee involvement is (85.7%). The statistical analysis indicates that there exists a significant difference in the mean responses perceived between aspects found to be significant at 5% level.

Table 3: Aspect Wise Mean Response As Perceived On TQM Implementation: MEDIUM Company N=48

No.	Aspects of TQM	Statements	Max. Score	Respondents Perceived			
				Mean	Mean (%)	SD (%)	Avg. Mean
F1	LTMC	7	35	30.6	87.4	4.7	4.37
F2	VPS	7	35	29.9	85.5	6.7	4.28
F3	SQM	6	30	26.1	87.0	6.5	4.35
F4	SPQI	6	30	26.7	89.0	6.9	4.45
F5	TEI	7	35	30.0	85.7	6.6	4.28
F6	ET	7	35	30.6	87.3	6.3	4.37
F7	PAR	7	35	31.0	88.5	6.8	4.42
F8	CFS	7	35	30.1	86.1	6.1	4.31
F9	En	9	45	39.6	88.0	6.1	4.40
F10	WEC	9	45	40.0	88.9	7.8	4.44
F11	CI	7	35	30.6	87.5	6.2	4.38
F12	Co	5	25	21.8	87.3	6.1	4.36
	Combined	84	420	367.0	87.4	5.1	4.37
	ANOVA TEST RESULTS			234.01*			

* Significant at 5 % Level

Source: Research Survey Data

D. Aspect Wise Mean Response as Practice on TQM Implementation: Small Companies

Table 4 shows the mean response as practice on TQM implementation among small companies. The result indicates that the overall mean practice on Total Quality Management Implementation of small manufacturing enterprises groups worked out be 57.0% and standard deviation table 14.1%. Further, the response on priority of aspect found to be Work Environment and culture (59.3%) followed by Customer Focus & Satisfaction (59.0%), Supplier quality management (58.3%), and Education & Training (58.1%).

Table 4: Aspect Wise Mean Responses as Practice on TQM Implementation: SMALL Company N=247

No.	Aspects of TQM	Statements	Max. Score	Respondents Perceived			
				Mean	Mean (%)	SD (%)	Avg. Mean
F1	LTMC	7	35	19.6	56.0	15.5	2.80
F2	VPS	7	35	19.0	54.2	13.0	2.71
F3	SQM	6	30	17.5	58.3	16.3	2.92
F4	SPQI	6	30	17.1	56.9	17.2	2.38
F5	TEI	7	35	18.6	53.3	13.5	2.66
F6	ET	7	35	20.3	58.1	13.4	2.91
F7	PAR	7	35	19.9	56.8	14.0	2.84
F8	CFS	7	35	20.6	59.0	17.0	2.95
F9	En	9	45	25.3	56.3	14.7	2.81
F10	WEC	9	45	26.7	59.3	17.2	2.97
F11	CI	7	35	20.3	57.9	18.0	2.90
F12	Co	5	25	14.3	57.3	14.9	2.86
	Combi	84	420	239.2	57.0	14.1	2.84

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	ned						
	ANOVA TEST RESULTS				**92.24***		

* Significant at 5 % Level

Source: Research Survey Data

However, the least response on practice towards Total Quality Management implementation among small companies is observed in Total employee involvement (53.3%) and Vision and plan statements (54.2%). Further, there exists a significant difference in aspects of practice response using ANOVA result is found significant at 5% level, (ANOVA result =92.24*).

E. Aspect Wise Mean Response as Practice on Total Quality Management Implementation: Medium Company

Table 5 shows the mean response as practice on TQM implementation in medium size companies. Among medium size companies are the mean practice response accounts to be 56.5% and standard deviation 14.6%. In the order of priority the practice response on Total Quality Management implementation in medium size companies is found with Work Environment and culture (59.9%), followed by Education and Training (58.0%) Supplier quality management (57.7%) and noticed System Process Quality Improvement (57.1%).

Further, the lowest response is viewed in the aspect of Total employee involvement (53.4%) & vision and plan statements (54.5%) and continuous Improvement (55.1%). The statistical test results indicate the existence of significant difference in the mean practice response between aspects (ANOVA result =18.52*).

Table 5: Aspect Wise Mean Response As Perceived On TQM Implementation: MEDIUM Company N=48

No.	Aspects of TQM	Statements	Max. Score	Respondents Perceived			
				Mean	Mean (%)	SD (%)	Avg. Mean
F1	LTMC	7	35	19.6	56.0	14.9	2.80
F2	VPS	7	35	19.1	54.5	13.0	2.72
F3	SQM	6	30	17.3	57.7	15.3	2.89
F4	SPQI	6	30	17.1	57.1	18.4	2.37
F5	TEI	7	35	18.7	53.4	14.4	2.67
F6	ET	7	35	20.3	58.0	15.1	2.90
F7	PAR	7	35	19.9	56.9	44.7	2.85
F8	CFS	7	35	19.9	56.9	17.6	2.85
F9	En	9	45	25.4	56.4	16.2	2.82
F10	WEC	9	45	26.9	59.9	17.0	2.99
F11	CI	7	35	19.3	55.1	16.9	2.76
F12	Co	5	25	13.8	55.3	15.3	2.77
	Combined	84	420	237.3	56.5	14.6	2.83
	ANOVA TEST RESULTS				18.52*		

* Significant at 5 % Level

Source: Research Survey Data

VII. Response On Overall Business Excellence (Small and Medium)

Following sections are indicating the dependent variables which lead to the business excellence.

a. Overall Mean Satisfaction Level of Employees on Overall Business Performance

Table 6 indicates the overall mean satisfaction level of employees on overall business performance. The result shows that the mean satisfaction of the employees of medium sized companies is found to be comparatively higher (45.2 %) as against small manufacturing sized companies (38.8%). Further, the overall mean satisfaction of the employees of combined groups is found to be 39.8% with S D as 20.3%. The result also substantiated significance in the mean satisfaction of employees between small and medium sized companies on overall business performance (t=2.49*).

Table 6: Overall Mean Satisfaction Level of Employees on Overall Business Performance

Company	Sample (n)	Satisfaction Scores			't' Test
		Mean	Mean (%)	SD (%)	
Small	247	3.88	38.8	19.9	
Medium	48	4.52	45.2	15.5	2.49 *
Combined	295	3.98	39.8	20.3	

* Significant at 5% level, **t (0.05, 293df) =1.96**

Source: Research Survey Data

B. Classification of Respondents on Perception Level on Quality of Product

Table 7 shows the classification of respondents on perception level on quality of product. The data reveals that 84.6% of the small group companies have a moderate perception level as compared to 15.4% of small groups which have adequate perception level (Fig.2).

Table 7: Classifications of Respondents on Perception Level on Quality of Product

Perception level	Category	Classification of company				$\chi 2$ Value
		Small		Medium		
		Number	Percent	Number	Percent	
Inadequate	< 50 % Score	0	0.0	0	0.0	
Moderate	51-75 % Score	209	84.6	35	72.9	3.85 *
Adequate	> 75 % Score	38	15.4	13	27.1	
Total		247	100.0	48	100.0	

Significant at 5 % Level

$\chi 2$ (0.05, 2df) = 5.991

Source: Research Survey Data

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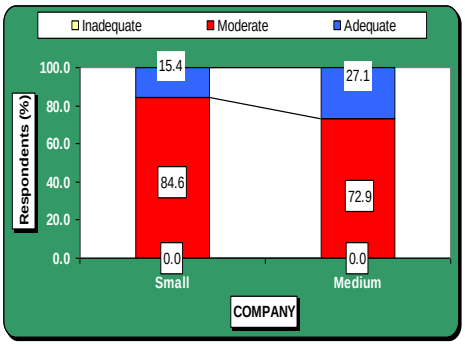


Source: Research Survey Data

Fig.2: Classification of Respondents' Perception Level on Quality of Products

Further among medium manufacturing enterprises groups the results indicate that 72.9% and 27.1% observed to be moderate & adequate respectively on quality of products. The statistical test indicates that the perception level on quality of product between small and medium manufacturing enterprises groups (t= 3.85 *).

c. Classification of Respondents on Satisfaction of Customer on Overall Business Performance

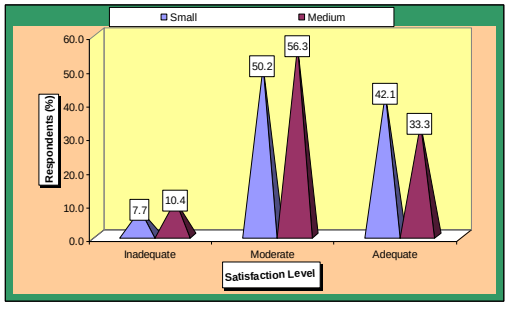
Table 8 shows the classification of respondents on satisfaction of customer on overall business performance. The result indicates that 50.2% and 56.3% of respondents among small group companies is found to be moderate and adequate level of customer satisfaction on overall business performance. On the contrary 56.3% and 27.1 % among medium group companies is found to be moderate and adequate satisfaction level respectively of customer on overall business performance (Fig.3).

Table 8: Classification of Respondents on Satisfaction of Customer on Overall Business Performance

Satisfaction Level	Category	Classification of Company				χ^2 Value
		Small		Medium		
		Number	Percent	Number	Percent	
Inadequate	< 50 % Score	16	6.5	8	16.7	
Moderate	51-75 % Score	124	50.2	27	56.3	8.02 *
Adequate	> 75 % Score	107	43.3	13	27.1	
Total		247	100.0	48	100.0	

* Significant at 5% level, **χ^2 (0.05, 2df) = 5.991**

Source: Research Survey Data



Source: Research Survey Data

Fig.3: Classification on Satisfaction Level of Customers on Overall Business Performance

d. Classification of Respondents on Strategic Business Performance.

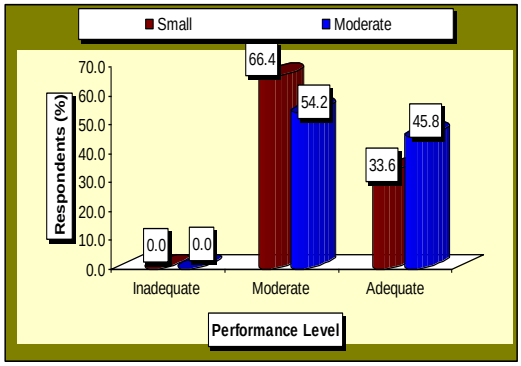
Table 9 shows the classification of respondents on strategic business performance. The result shows that 66.4% & 54.2% of small and medium sized companies measured the performance level as moderate while compared to remaining 33.6% and 45.8% of the respective groups noticed with adequate performance level (Fig. 4). The chi-square test indicates the association between performance level among the small and medium study groups which is found to be non-insignificant (**(χ^2=2.62 NS)**.

Table 9: Classification of Respondents on Satisfaction of Customer on Overall Business Performance

Performance Level	Category	Classification of Company				χ^2 Value
		Small		Medium		
		Number	Percent	Number	Percent	
Inadequate	< 50 % Score	0	0.0	0	0.0	2.62 NS
Moderate	51-75 % Score	164	66.4	26	54.2	
Adequate	> 75 % Score	83	33.6	22	45.8	
Total		247	100.0	48	100.0	

NS: Non-significant **χ^2 (0.05, 1df) =3.841**

Source: Research Survey Data



Source: Research Survey Data

Fig. 4: Classification of Respondents on Strategic Business Performance Level

VIII. FACTOR ANALYSIS

Factor analysis is a data reduction technique used to reduce large number variables to a smaller set of underlying factor that summarize the essential information contained in the variables. The factor analysis procedure comprises a number of steps such as computation of the correlation matrix, communality factor matrix and rotation factors matrix.

a. Descriptive Statistics

According to Leedy and Ormrod (2005) the sample size is around 30% is sufficient. To align with this research a number of 950 questionnaires have been sent to the owners or top management of the companies. Out of this, only 295 were usable, with a response rate of 31.05% that is considered acceptable (Table 10).

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Table 10: Descriptive Statistics

	Mean	Std. Deviation	Analysis N
AVG B E	3.4367	.34818	295
LTMC	2.7979	.76730	295
VPS	2.7127	.64920	295
SQM	2.9108	.80488	295
SPQI	2.8452	.86878	295
TEI	2.6641	.68106	295
ET	2.9055	.68479	295
PAR	2.8418	.70466	295
CFS	2.9315	.85371	295
En	2.8145	.74797	295
WEC	2.9701	.85558	295
CI	2.8745	.89429	295
Co	2.8481	.74723	295

Source: Research Survey Data

b. Internal Consistency Analysis

Using the SPSS reliability analysis procedure, an internal consistency analysis was performed separately for the items of each critical factor. Cranach's Alpha is commonly used for this purpose. Values of alpha range between 0 and 1.0, with higher values indicating higher reliability. The value of each variable, as measured by each statement on the scale of 1 to 5, is computed using the reliability analysis procedure shown in Table 11. Table 11 shows Cranach's coefficient alpha for the 12 (twelve) variables factor consideration in this study. The alpha values range from 0.8437 to 0.9262, which indicates an internal consistency with the alpha value of more than 0.75, so no items were dropped from each variable. These results are therefore acceptable and are reliable.

Table 11: Internal Consistency Analysis (Reliability Test-Cranach's Alpha)

Factors	Quality management practice	No. of items	Alpha value	Item for deletion	Alpha if item deleted
F1	LTMC	7	.8818	none	.8833
F2	VPS	7	.8511	none	.8532
F3	SQM	6	.9023	none	.9019
F4	SPQI	6	.9064	none	.9065
F5	TEI	7	.8506	none	.8546
F6	ET	7	.8653	none	.8606
F7	PAR	7	.8639	none	.8608
F8	CFS	7	.9188	none	.9193
F9	En	9	.9019	none	.9017
F10	WEC	9	.9270	none	.9262
F11	CI	7	.9090	none	.9089
F12	Co	5	.8421	none	.8437
	Total	84	0.885	none	0.885

Source: Research Survey Data

c. The Correlation Matrix (Preliminary Analysis)

The next output from the analysis is the correlation coefficient. Theoretically, the higher the value of the correlation between two variables, the more related these variables are to each other. The direction of relationships among variables is another issue that should be considered in analyzing the correlations between variables. A positive correlation indicates that the direction of the relationship is positive. A negative correlation indicates an inverse relationship between variables. A correlation matrix is simply a rectangular array of numbers which gives the correlation coefficients between a single variable and every other variable in the investigation. The correlation coefficient between a variable and itself is always one. Hence the principal diagonal of the correlation matrix contains 1. The correlation coefficients above and below the principal diagonal are the same. The top half of the table contains the Pearson correlation coefficient between all pairs of questions whether the bottom half contains the one-tailed significance of these coefficients. The determinant of the correlation matrix is shown at the foot of the table below. Referring to SPSS result on correlation coefficient matrix for all variables (Table 12), it can see that independent variables are significant with overall business performance companies, because significantly has strong correlated at less than the 0.05 level, either positively or negatively, with one another, which suggests that they may constitute one or more factor. The results from the correlation variable analysis Table 8 show that evaluation (En) the highest correlation with performance appraisal, recognition (PAR) (r=0.893), performance appraisal, recognition (PAR) has the highest correlation with Education and Training (ET) (r=0.892), evaluation (En) the highest correlation with total employee involvement.(TEI) (r=0.892), and communication. (Co) has the highest correlation with Continuous improvement (CI) result (r=0.890).

Table 12: Component Correlation Matrix (a) (Variable)

		AVG B E	LTMC	VPS	SQM	SPQI	TEI	ET	PAR	CFS	EN	WEC	CI	Co
Correlation	AVG B E	1.000	.493	.439	.450	.391	.426	.468	.435	.392	.420	.516	.397	.334
	LTMC		1.000	.876	.871	.718	.755	.830	.769	.745	.817	.802	.807	.746
	VPS			1.000	.847	.733	.843	.805	.829	.735	.851	.786	.846	.791
	SQM				1.000	.837	.733	.832	.816	.842	.836	.842	.829	.786

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	SPQI					1.000	.774	.805	.839	.831	.788	.772	.716	.661
	TEI						1.000	.848	.887	.764	.892	.801	.841	.791
	ET							1.000	.892	.878	.935	.916	.858	.835
	PAR								1.000	.861	.893	.884	.838	.844
	CFS									1.000	.850	.846	.853	.818
	EN										1.000	.878	.889	.822
	WEC											1.000	.834	.821
	CI												1.000	.890
	Co													1.000
Sig. (1-tailed)	AVG B E		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	LTM C	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	VPS	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	SQM	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	SPQI	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000	.000
	TEI	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000	.000
	ET	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	PAR	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000	.000
	CFS	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000	.000
	EN	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000	.000
	WEC	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	CI	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000		.000
	Co	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	

Determinant = 1.028E-09

Source: Research Survey Data

The results from the correlation variable analysis Based on the correlation matrix, the highest correlation is between Business excellence among work environment and culture (WEC) (r=0.516), while others are leadership & top management commitment (LTMC) (r=0.493), education and training (ET) (r=.468), supplier quality management (SQM) (r=0.450), vision and plan statement (VPS) (r=0.439). Referring to the result analysis of correlation coefficient among individual variable (IV) and dependent variable (DV) (Table 8), we can see that all the variables for this study are significant with the overall performance company, because there is a strong correlation with overall satisfaction.

d. Kaiser-Meyer-Olkin (KMO) and Bartlett's Test Sphericity

The next item from the output is the Kaiser-Meyer-Olkin (KMO) and Bartlett's test.

e. ***Kaiser-Meyer-Olkin Measure of Sampling Adequacy***

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.927. The KMO is a measure of the degree of inter-correlation among the variables and the appropriateness of factor analysis. This measure varies between 0 and 1, and values closer to 1 are better. A value of .6 is a suggested minimum.

f. ***Bartlett's Test of Sphericity***

This tests the null hypothesis that the correlation matrix is an identity matrix. An identity matrix is matrix in which all of the diagonal elements are 1 and all off diagonal elements are 0. Reject this null hypothesis. Taken together, these tests provide a minimum standard which should be passed before a factor analysis (or a principal components analysis) should be conducted. Based on KMO and Bartlett's test, the factor analysis result shows that performance companies are significant (Table13). This is because the data SPSS KMO of sampling is adequate with 0.927 > KMO standard requirement of 0.60 or 0.70 which is therefore factor analysis is appropriate and accepted. Bartlett's test of sphericity; Approx Chi-square = 5977.502, Degree of Freedom (df) =78 and significance (Sig) = 0.000. So the measure of sampling the all variable is significant and accepted.

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Table 13: KMO and Bartlett's Test Sphericity

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	5977.502
	Df	78
	Sig.	.000

Source: Research Survey Data

The KMO statistic varies between 0 and 1. A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be inappropriate). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors. Kaiser (1974) recommends accepting values greater than 0.5 as acceptable, 0.5 to 0.7 are moderate, between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are superb. For these data the value is 0.927, which falls in the range of being superb: so, it is confident that factor analysis is appropriate for these data. Bartlett's measures test the null hypothesis that the original correlations matrix is an identity matrix. For factor analysis to work need some relationships between variables and if the R-matrix were an identity matrix then all correlation coefficients would be zero. Therefore, we want this test to be significant (i.e. have significant value less than 0.05). A significant test tells that the R- matrix is not an identity matrix; therefore, there are some relationships between the variables we hope to include the analysis. For these data, Bartlett's test is highly significant ($p<0.001$), therefore the factor analysis is appropriate (Table 9).

g. Total Variance Explained (Factor extraction)

The next item shows all the factors extractable from the analysis along with their Eigen values, the percent of variance attributable to each factor, and the cumulative variance of the factor and the previous factors. Notice that the first factor accounts for 83.817% of the variance. The initial factors produced by a principal components analysis of the performance and TQM extension practices variables item and the amount of the variance they account for (their Eigen value) is presented in Table 14. The variance accounted for by the first factors is 10.058, or 79.209 percent of the total variance. The total variance explained by the twelve factors is simply the sum of their Eigen value, which in this case is 12. The proportional of variance accounted for by one factor is its Eigen value divided by the sum of Eigen values, which is multiple by 100 to convert it to a percentage. Thus, for this pilot project, the proportional of variance due to the first factors is about 10.297/13 or 0.79209, which multiplied by 100 equals 79.209.

Table 14: Initial Principal Components and Their Variance (Performance) Total Variance Explained

variable element	Initial Eigen values			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
AVG BE	10.297	79.209	79.209	10.297	79.209	79.209
LTMC	.806	6.203	85.412			
VPS	.427	3.288	88.700			
SQM	.383	2.948	91.649			
SPQI	.319	2.454	94.102			
TEI	.198	1.523	95.625			
ET	.150	1.157	96.783			
PAR	.103	.796	97.579			
CFS	.087	.669	98.248			
EN	.078	.600	98.848			
WEC	.061	.468	99.316			
CI	.055	.425	99.741			
Co	.034	.259	100.000			

Extraction Method: Principal Component Analysis.

Source: Research Survey Data

h. Scree Plot

The scree plot is a graph of the Eigen values against all the factors. The graph is useful for determining how many factors to retain. The point of interest is where the curve starts to flatten. The scree plot is shown in Fig 5 with a thunder bolt indicating the point of inflexion on the curve. This curve is difficult to interpret because the curve begins to tail off after one factor, before a stable plateau is reached. Therefore, it could probably justify retaining one factor, given the large sample, it is probably safe to assume Kaiser's criterion; however, it could return the analysis specifying that SPSS extract only one factors and compare the results.

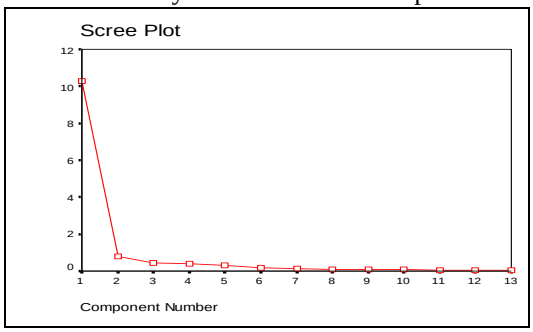

Fig. 5: Scree plot

IX. DISCUSSION

The research study provides a deeper insight to implement and improve quality management practices in organization in order to promote business excellence, and help people in organizations realize their potential. It aims at improving the organizational business excellence measures, improve the

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functioning of the total organization, and educate all stakeholders on how to continuously improve their own functioning. Based on the data and statistical analysis using SPSS 11.5 software, it can be summarized that the techniques for analyses of data, and other measures for reliability, validity, and several others have been spelt out. Analysis of data, results and discussion for this study are presented. Important results from the survey analyses is that there is a strong evidence that the total quality management (TQM) extension practices and performance is very significant and have influences to ensure and enhance the level of performance business excellence in north Karnataka SMEs. The outcome of this study is expected to be used by north Karnataka SMEs in establishing the best strategy in developing business excellence in the north Karnataka industry to meet the need of this present time and the future. The analysis of the results indicate that the correlation matrix reveal the element variables of TQM extension practices support the construct of the model and significantly correlate with one another in practices in the north Karnataka SMEs. Table 8 shows that TQM extension practices play a critical role and as such, it is the statistically significant variable having the highest correlation with one and other variables. The results from the correlation variable analysis Table 6.6 show that evaluation (En) the highest correlation with performance appraisal, recognition (PAR) (r=0.893), (over the other variable) and the correlation matrix, the highest correlation is between Business excellence (BE) and WEC Focus r = 0.516 (over the other variable). Referring to the analysis of correlation coefficient result between individual variable and dependent variable, it shows that all the variables of this study are significant and have strong correlation with the overall business excellence. The result of correlation analysis of all the independent and dependent variables are significant, correlated, accepted, and supported the implementation of extension of TQM practices in the north Karnataka SMEs. This analysis is in agreement with previous studies carried out by researchers, thus, it comply with other business excellent models. This study also addressed how the twelve independent variables (CSFs) and the four dependent variables of TQM extension practices influence the business excellence of north Karnataka SMEs. A screen plot further supports this result. Table 10 shows TQM extension practices and performance - indicator construct for correlation matrix, total variance explained, reliability test statistics Table 7, component matrix, and KMO and Bartlett tests Table 9. All the twelve CSFs of TQM extension practices and performance analysis correlate highly with each other and each was significantly associated with the underlying latent variable. The 79.209 % of the total variance can be explained by the first factor in business excellence of north Karnataka SMEs. In other words, the resulting factor component matrix explains 79.209 % of the information yielded by the twelve CSFs. The dimension survey questions of research study above was analyzed based on measured, investigated, reviewed, developed and analysis of core element variables of TQM extension practices and performance study in the 295 north Karnataka SMEs. The findings of present study are useful to both practitioners and researchers.

The practitioners can use this model to:

i. Identify areas where improvements are possible.
ii. Evaluate the extent of total quality management, practices in their organizations.
iii. Recognize areas where excellence currently exists.
iv. Use this as benchmark tool for relative comparison with the other organizations.

The researcher can use the findings of this study to:

i. Compare the extent of practices across various sectors.
ii. Conduct similar studies in specific industry.
iii. Evaluate various quality award models.
iv. Test and develop on critical success factors of total quality management in a specific industry.

This, the analysis reveal that there is a significant difference between the TQM perceived & practices of small and medium sized companies. The paper concludes with suggestions on how to close the gap between perceptions of the importance and practices of CSFs in implementing TQM.

X. CONCLUSION

The CSFs presented in the paper act as a guide for small and medium sized manufacturing enterprises contemplating a TQM initiative. Aspect wise mean response as perceived and practice on total quality management implementation is found to be significant. One observation was that many of the respondents have rated ‘the degree of practice’ at the lower end of the scale, between ‘moderate’ to ‘agree’. This could indicate that the companies could be still struggling to implement TQM successfully. Thus TQM extension practices implementation toward business excellence in small and medium sized manufacturing enterprise north Karnataka are very relevant.

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