

Implementation Status of TQM Practices in Textile and Apparel Industrial Organization: A case study from Faisalabad, Pakistan

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ABSTRACT

Aims: Purpose of the study was to check the provision of Total Quality Management practices in textile industry of Pakistan. For this purpose we have evaluated Total Quality Management practices in textile industry. The focal intention behind this study was to get first hand information about this problem for further detailed research.

Place and Duration of Study: Study was conducted in Masood Textile Mills Faisalabad. Duration of study was from February 2012 to October 2012.

Methodology: The project was started with literature survey. Then existing management systems within the organization were studied. A TQM inspection tool that was made to evaluate TQM practices in Chinese manufacturing industries was used to evaluate quality management practices in the industry (TQM inspection tool on 5-point likert scale). In order to evaluate implementation status of TQM practices in the organization, Pearson correlation was used.

Results: Each element of 11 quality constructs was correlated with elements of "Measurement of product quality". Then negative relation between the two became the deficiency elements.

Conclusion: It has been evaluated that the organization will have to improve education to the employee about Total Quality Management and also room for improvement is still there in Statistical Process Control (SPC), Evaluation system and Employee participation in quality related decisions.

Keywords: TQM, Textile Industry, Pakistan.

1. INTRODUCTION (ARIAL, BOLD, 11 FONT, LEFT ALIGNED, CAPS)

Total quality management (TQM) has its origins over 60 years ago in the International Journal of Quality concept of organization-wide or total quality control (TQC) proposed by Feigenbaum (1956) wherein each function contributing to the added value of a product shares responsibility for its quality. This concept migrated to Japan in the 1950s together with the practitioner-based teachings of Juran (1964) and Implementing Deming (1982). Total quality is defined as the unrelenting pursuit of continuous improvement which is realized by accessing and utilizing the intensive knowledge and experience of managers and employees at all levels (Kossoff, 1993). There are significant relationships between TQM, competitive advantage and business excellence (Powell, 1995). Global competition and economic liberalization are creating opportunities not only for Pakistani organizations but also for whole developing world. TQM is a management philosophy that encourages customer satisfaction, continuous improvement, teamwork and strong aspirations to self-actualization (Williams, 1994). Total quality management (TQM) is one of the most

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32 popular modern management concepts (Bayazit, 2003). It is the discipline dedicated to
33 enhance quality in every aspect of an organization.

34
35 Over the past few decades, TQM seers such as Deming (1986), Crosby (1979), Feigenbaum
36 (1991), Ishikawa (1985), and others have developed certain proposals in the area of quality
37 management. There are several Quality Awards world-wide, such as the Deming Prize (1992)
38 in Japan, the European Quality Award in Europe (1994) and the Malcolm Baldrige National
39 Quality Award (1997) in the USA. Each of these awards is based on a perceived model of
40 TQM. They do not focus only on product, service perfection or traditional quality management
41 methods, but consider a wide range of management activities, behavior and processes that
42 manipulate the quality of the final offerings. These award models provide a useful audit or
43 assessment framework against which organizations can be evaluated. The practice of total
44 quality management (TQM) as an improvement strategy is being embraced by more and more
45 organizations throughout the world as quality has become a competitive mandate. The
46 premise of TQM is quite clear. Quality improvement can be achieved if an organization
47 develops a management philosophy of continuous improvement and provides the necessary
48 supporting organizational practices (Juran, 1993).

49 50 1.1 TQM Implementation Framework

51 Based on the comprehensive review of the TQM literature, the subsequent 11 constructs are
52 considered to be the TQM implementation constructs in present study. Leadership, Supplier
53 quality management, Vision and plan statement, Evaluation, Process control and
54 improvement, Product design, Quality system improvement, Employee participation,
55 Recognition and reward, Education and training and Customer focus (Zhang et al., 2000). The
56 European Quality Award recognizes the crucial role of top management leadership in creating
57 the goals, values and systems that guide the detection of continuous performance
58 improvement. Lack of top management commitment is always considered one of the reasons
59 for the failure of TQM efforts (Brown, 1994). Supplier quality management is an important
60 aspect of TQM since materials and purchased parts are repeatedly a major source of quality
61 problems. The Malcolm Baldrige Quality Award (1997) is also aware of the importance of
62 supplier quality.

63
64 A vision statement describes how a company wants to be seen in its selected business. As
65 such, vision describes standards, values, and beliefs. Evaluating the situation in organizations,
66 quality management practices provide an important base for organizations to improve their
67 quality management practices. A key element of any total quality strategy is the management
68 of processes (Porter & Parker, 1993). One important matter in process management is to
69 make sure that process capability can meet production requirements. One aspect of process
70 management is equipment maintenance, which ensures that variation is kept within
71 acceptable limits, keeping the manufacturing process running efficiently and effectively. Good
72 process management should involve exactly documenting various process procedures, with
73 instructions for equipment operation in order to minimize the possibility of operator errors.

74
75 Product design is significant dimension of quality management. For complex products, errors
76 during product development cause about 50% of condition for use problems. Sound product
77 design meets or exceeds the requirements and hope of customers better than the
78 competitors, leading to an improved market share. For improving product design, designing
79 engineers are required to have some shop floor and marketing experiences. Customer
80 requirements and production cost should be thoroughly measured during the method of
81 product designing. All the associated departments in a business should take part in new
82 product improvement. Before preparing, new product plan should be carefully reviewed in
83 order to stay away from troubles occurrence during production. A distinctive quality system as
84 part of a TQM plan can contribute to TQM by running the organization's processes in a regular

way. A quality system is definite as the organizational composition, procedures, processes and revenue needed to execute quality management (ISO 8402, 1994). In 1987, ISO published the ISO 9000 standards series on quality administration and quality declaration. When ISO 9000 is implemented, a quality instruction manual, quality procedures, and work instructions are recognized. An organization may eventually apply to be registered as having an ISO 9001 (9002 or 9003) quality certificate.

By participating in quality improvement activities, employees acquire new understanding, see the benefits of the quality disciplines, and gain a sense of achievement by solving value problems. The participation leads to lasting changes in behavior. Participation is decisive in inspiring action on quality improvement (Juran, 1993). Participation may enable the employees to improve their personal capabilities, increase their self respect, commit themselves to the success of their organizations, and/or change certain character. Involvement may also change employees' negative attitudes and instill in the employees a better understanding of the importance of product quality. Involvement may contribute to the concern of a company-wide quality culture. Employees in organizations should be optimistic to report their work problems. Good employees' suggestions should be implemented after being evaluated. Methods such as cross-functional teams, functional teams, QC circles, voluntary teams, and suggestion schemes can be used for encouraging employee participation.

It almost goes without saying that an important feature of any quality improvement program is performance due recognition for enhanced performance by any individual, section, and department or division within the organization (Dale and Plunkett, 1990). Both teams and individuals can be recognized and rewarded for their superb performance. To effectively support organization's quality efforts, they have to implement reward system that strongly links quality and customer satisfaction with pay (Brown et al., 1994). Recognition and reward activities are supposed to effectively stimulate employee assurance to quality improvement. Otherwise, these activities are subject to fail. Working condition improvements, salary promotions, position promotions, financial awards for excellent suggestions are good methods for recognition and reward. Deming (1986) forces the importance of education and training for continual updating and improvement. Many research results disclose that education and training are one of the most important elements in a successful implementation of TQM (e.g. Mann, 1992). The research confirms what most organizations have already realized, namely, that education and training are a fundamental and necessary part of the TQM initiative. Investment in education and training is fundamentally important for TQM success. Employees should consider as valuable, long-term resources worthy of receiving education and training throughout their career. All management personnel, supervisors, and employees should believe quality education and training such as quality awareness education and quality management methods education.

To get quality, it is essential to know what customers desire and to provide products or services that meet their requirements (Ishikawa, 1985). Successful organizations distinguish the need to put the customer first in every decision made. The key to quality management is sustaining a close relationship with the customer in order to fully agree on the customer's needs, as well as to get feedback on the extent to which those needs are being met. The customer should be closely concerned in the product design and advance process, with inputs at every stage of the process so that there is less likelihood of quality problems once full production begins (Flynn et al., 1994). The ultimate measure of company performance is customer liking, which may very well predict the future success or failure of an organization (Kanji and Asher, 1993). In order to get better customer satisfaction, customer complaints should therefore be treated with top priority. Warranty on sold products should also be offered. Methods that can be used for customer retention and satisfaction include collections of customer complaint information, market investigations, and customer contentment surveys.

138 1.2 Study of Organization

139 1.2.1 Brief Introduction of Organization

140 Masood Textile Mills Ltd. is one of the few fully vertical textile mills in Pakistan having in-house
141 Yarn, Knitting, Fabric dyeing, Processing, and Laundry & Apparel Manufacturing facilities. The
142 vertically integrated operations help in achieving shorter lead times and greater flexibility to
143 outfit to the customers' demand.

144 1.2.2 Company Vision:

145 Organization defines its vision as; "Our vision is of continual improvement and sustained
146 growth, and of a family of workers, who are given the best compensation benefits and working
147 conditions in the region. In this respect, Masood Textile Mills Ltd. continues to stress the need
148 to invest in and develop its most precious resource - its human capital. Organization continues
149 to provide training courses and self-enhancement opportunities for all our workers".

150 1.2.3 Targeted Facility

151 There are quality check points at every stage of manufacturing starting from raw cotton,
152 yarn, fabric, processing, cutting, stitching and packing. Before the fabric is cut, it is checked
153 whether it conforms to the customer standards of shrinkage, weight, etc. After each lot of
154 fabric is cut, 100% cut parts inspection is conducted to ensure that only high-quality pieces
155 move to stitching units. During the process of sewing, each and every process is inspected by
156 inline inspectors. The inspectors make sure that only good parts move to the next stage. An
157 individual tracking number is sewn inside each garment. After trimming and pressing of
158 garments, highly experienced final inspectors inspect each garment. The quality assurance
159 team monitors the performance of every individual inspector by picking up the inspected
160 garments and checking the quality of these garments. To ensure that the garments are
161 packed as per necessities of customers, we can even track & check, which case the garment,
162 has been packed in. with the help of this, we plan to attain the zero defect level.
163 Apparel manufacturing division of the Masood Textile Mills was targeted for the assessment of
164 the TQM practices. This was selected because organization deals more in Apparel exports
165 than any of the other products like yarn, Greig Fabric, Finished Fabric, etc. All the other
166 processes have their own quality control and quality assurance teams. In attire manufacturing
167 all the defects have to be removed before the final packing either faults belong to the yarn,
168 fabric or stitched garment.

169 1.2.4 Infrastructure & Hierarchy

170 Being the leading organization in textile and apparel business the Masood Textile Mills has
171 strong infrastructure with respect to machine. In the stitching they have different sites with
172 following machine setups.

174

Stitching Setup Location	Sub unit	Machines	Total Machines
Apparel – I	Main Unit	1082	1350
	Panther	286	
Apparel – II	Falcon	484	587
	Leopard	103	
Apparel – III	Crescent	766	1234
	Peacock	458	
Total Machines			3171

175

176 Table: 2.1 Machine setup

177 For each subunit there is one Sr. Manager and for each main setup they have DGM.

178

179 For each manager (Asst, Depty & Sr manager) there are prescribed number of machines

180 1.2.5 ISO Certification

181 ISO department provides a management system at organization, as per their claim renders
182 the product free of non conformance. The department has training system that creates
183 understanding of Total Quality Management (TQM). A qualified team of employees and
184 certified auditors do their efforts to improve and ensure the consistency in the system.

185 1.2.6 WRAP Certification

186 The Worldwide Responsible Apparel Production Principles are minimum standards for
187 production facilities participating in the Worldwide Responsible Apparel Production
188 certification Program. The Program's objective is to demonstrate the apparel industry's
189 commitment to socially responsible business practices and to assure that sewn products are
190 produced under lawful, caring and moral conditions. Participating companies voluntarily
191 agree that their production and that of their contractors will be certified by an independent
192 monitor as complying with these standards. Created by a working group of the American
193 Apparel & Footwear Association in 1997, WRAP became a standalone entity in 2000. While
194 it was founded by clothing industry companies, WRAP's charter requires that a majority of its
195 board members come from outside the apparel industry.

196

197 Almost 10 years ago, the industry began a process to demonstrate its commitment to
198 responsible business practices and to ensure that apparel is produced under lawful, humane
199 and ethical conditions. The process has reached out to many interested constituencies
200 outside the apparel manufacturing community, including retailers, human rights advocates,
201 public interest organizations, development agencies, and the licensing community.

202 The first result of this process was the development of the Worldwide Responsible
203 Accredited Production Principles -- basic standards that address labor practices, factory
204 conditions, and environmental and customs compliance. Global support for WRAP from
205 consumers, manufacturers and governments grows monthly. In addition to the endorsement
206 of the WRAP Principles, the manufacturing associations and member manufacturing
207 companies are actively participating in the WRAP Certification Program. The WRAP
208 Certification Program is the only independent and globally supported factory certification
209 program requiring manufacturers to comply with the 12 universally accepted WRAP
210 Production Principles assuring safe and healthy workplace conditions, and respect for
211 workers' rights.

212 Many manufacturers have commented that WRAP has not only resulted in more reliable
213 social compliance, but has contributed to greater productivity, lower turnover, improved
214 communications between management and employees, safer working conditions and
215 improved morale. Today, WRAP is being recognized by many retailers and manufacturers
216 as the most reliable, yet economically efficient factory compliance system to assure lawful,
217 ethical and humane manufacturing.

218

219 1.2.7 Summarizing the TQM practices in Industry

220 In Masood Textile Mills Ltd. as long as compliance and ISO standards are concerned,
221 Organization lack behind on many standards that will be discussed in the next sections of
222 the work. In apparel manufacturing there are two departments named "Quality Control" and
223 "Quality Assurance" to maintain quality of the process. Although policy statements and
224 quality manuals exist, still there is gigantic gap between the documentation and
225 implementation. This gap is discussed in the later sections.

226 1.2.8 Assessment of TQM practices

227 To evaluate the implementation status of total quality management in textile industry, TQM
228 implementation instrument is prepared in the light of instrument used to evaluate TQM
229 execution for Chinese manufacturing companies (IJQRM 17, 7 PP 730-755) and circulate

among the key persons in the industry. According to this paper the instrument presented is reliable and valid and may be used to target improvement areas.

2. MATERIAL AND METHODS

In this study, validity was a measure of how well scales representing the various quality management practices are related to measures of product quality performance (the criteria) (Flynn et al., 1994). Product quality performance was measured by asking respondents to rate (on a five-point scale, 1 = worst in the industry; 2 = below average; 3 = average; 4 = above average; 5 = best in the industry) seven indices. These indices included, for example, performance, conformity rates, reliability, durability, defect rates of their primary products, internal failure costs, and warranty claims costs as a percentage of their annual sales. Accordingly, bi-variate correlation (Pearson) was conducted to study the interrelationships between the independent and dependent variable sets: the TQM implementation (predictor set) and the product quality performance measures (the criterion set). Fortunately, the correlation within the 11 scales (predictor set), within the seven measures (criterion set), between the predictor set and criterion set was significant at the 0.01 level. It can therefore be concluded that this set of scales had good criterion-related validity.

Correlation analysis

The correlation coefficient is a measure of association between two attributes or variables that estimates direction and strength of the linear relationship, after the statistician Karl Pearson as discussed by David, George & Akisa (2002).

Analysis of Variance (ANOVA)

A statistical technique to test the difference of two or more means is the Analysis of Variance (ANOVA) as described by David K. et al 2002.

Data Collection

For the study in the trade to access the TQM status of accomplishment the decision making personnel from different departments are chosen. The TQM execution assessment tool was distributed among the key persons by emails and by visiting the industry on their location. The departments and designators from whom the data was composed is as follow

Sample Size

Total sample size consists of 79 people. Detail about the sample size effects and number of persons in one designation in sample size is as follows. Total questionnaires distributed in industry were 116. But total respondents were 79.

3. RESULTS AND DISCUSSION

Analysis of Variance (ANOVA) Table of All Tools of TQM

Tools of TQM	S.O.V	SS	df	MS	F	P-value
Leadership	Between Elements	25.038	7	3.577	7.383	.000**
	Within Elements	302.304	624	0.484	--	--
	Total	327.342	631	--	--	--
Supplier quality management	Between Elements	7.859	5	1.572	3.681	.003*
	Within Elements	199.823	468	0.427	--	--
	Total	207.681	473	--	--	--
Vision & Plan statement	Between Elements	20.771	7	2.967	6.908	.000**
	Within Elements	268.025	624	0.430	--	--
	Total	288.796	631	--	--	--
Evaluation	Between Elements	61.505	9	6.834	13.183	.000**
	Within Elements	404.329	780	0.518	--	--
	Total	465.834	789	--	--	--
Process Control and	Between Elements	190.070	7	27.153	53.515	.000**
	Within Elements	316.608	624	0.507	--	--

Improvement	Total	506.677	631	--	--	--
Product Design	Between Elements	16.087	7	2.298	5.196	.000**
	Within Elements	275.975	624	0.442	--	--
	Total	292.062	631	--	--	--
Quality System Improvement	Between Elements	6.927	4	1.732	4.703	.001**
	Within Elements	143.595	390	0.368	--	--
	Total	150.522	394	--	--	--
Employee participation	Between Elements	25.266	7	3.609	8.558	.000**
	Within Elements	263.165	624	0.422	--	--
	Total	288.430	631	--	--	--
Recognition and reward	Between Elements	34.568	5	6.914	12.870	.000**
	Within Elements	251.392	468	0.537	--	--
	Total	285.960	473	--	--	--
Education and training	Between Elements	39.200	5	7.840	14.603	.000**
	Within Elements	251.266	468	0.537	--	--
	Total	290.466	473	--	--	--
Customer focus	Between Elements	28.466	5	5.693	11.817	.000**
	Within Elements	225.468	468	0.482	--	--
	Total	253.935	473	--	--	--
Product Quality	Between Elements	31.986	6	5.331	12.003	.000**
	Within Elements	242.506	546	0.444	--	--
	Total	274.492	552	--	--	--

** Highly significant at 5% level of significance.

The Analysis of variance (ANOVA) table indicates that the score of different elements in all TQM tools are highly significant at 5% level of significance.

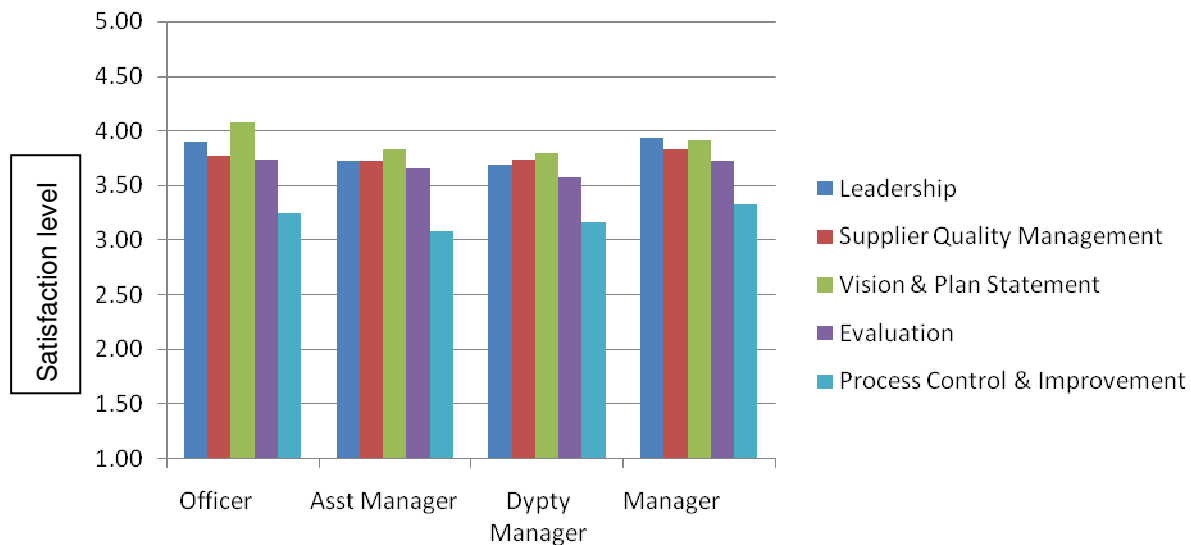
Performance of the organization

Designee Vs Quality Construct

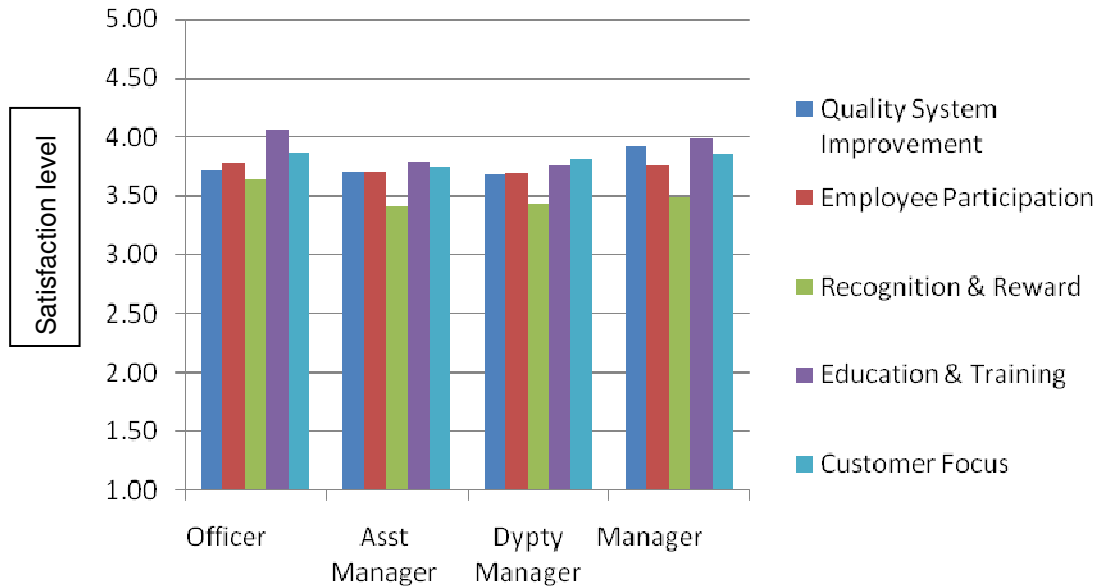
As long as understanding of different quality construct by different designees is concerned, result of their satisfaction level towards implementation of the described construct is as follows;

Satisfaction level about implementation of quality construct by various levels in hierarchy is different. Mean values of satisfaction level are illustrated in graph 5.1(a) and 5.1(b).

Managers' satisfaction level score is higher as compared to others on leadership and supplier quality management. In case of vision & plan statement and evaluation each level in hierarchy is satisfied. Satisfaction level of managers about Process Control and Improvement is higher among the hierarchy



Graph: 5.1(a) Satisfaction level by Different Designees
Mangers are more convinced in quality system improvement than others. Because they actually have bird's eye view on the quality policy and they can notice even a small improvement in the process. Each level in hierarchy believes that everyone is get involved in the problem solving issues.



Graph: 5.1(b) Satisfaction level by Different Designees
Officers are more convinced about Recognition and Reward system in the organization than other levels in the hierarchy. Same is the case in Education & Training.

An organization's success depends on how much customer is happy with services/product offered by the company. Out of the eleven construct of the TQM mention in the literature survey, construct of the product quality has importance in correlating with others. Therefore one should acknowledge that all the constructs of total quality management has direct or indirect relation with one of the "Product Quality".
Now all the construct of TQM will be correlated with product quality in order to better analyze the implementation status of quality management practices in the organization.
First of all elements of product quality will be correlated with itself as. Elements of product quality are numbered as P1 to P7.
Pearson Correlation (Product Quality P1-P6)

Indicators		Product Quality						
		Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)
Product Quality		P1	P2	P3	P4	P5	P6	P7
	P1	1	-.015 (.898)	.077 (.501)	-.349(**) (.002)	-.025 (.827)	.182 (.109)	.061 (.594)
	P2	-.015 (.898)	1	.492(**) (.000)	.036 (.756)	-.093 (.415)	-.045 (.696)	.128 (.259)
	P3	.077 (.501)	.492(**) (.000)	1	.147 (.196)	-.241(*) (.032)	.183 (.107)	.180 (.113)
	P4	-.349(**) (.002)	.036 (.756)	.147 (.196)	1	-.064 (.577)	-.051 (.655)	-.067 (.557)

	P5	-.025 (.827)	-.093 (.415)	-.241(*) (.032)	-.064 (.577)	1	.262(*) (.020)	.203 (.073)
	P6	.182 (.109)	-.045 (.696)	.183 (.107)	-.051 (.655)	.262(*) (.020)	1	.116 (.310)
	P7	.061 (.594)	.128 (.259)	.180 (.113)	-.067 (.557)	.203 (.073)	.116 (.310)	1

306

Table: 5.3 Measurement of Product Quality (Correlation)

307 P2 and P3 are significantly correlated with each other. As conformity of the product
308 increases, reliability of the primary product also increases in the same trend. Element of
309 Defects rate (P5) is negatively correlated with reliability of the product, which is a good sign
310 for the organization. As the defects rate reduces reliability increases, but it should be
311 stronger than existing results. Performance of the primary product is negatively correlated
312 with the durability of the product. which shows that they are focusing on the technical
313 features of the material than its performance as in this case performance mean that how
314 material/product behaves against sunlight, washes, rubbing, etc. so one should care for the
315 performance of the product as well.

316

317 Now all the constructs of quality will be analyzed with the product quality one by one.

318

319

320

1. Leadership

321

322

Quality Construct	Indicators	Product Quality						
		Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)
		P1	P2	P3	P4	P5	P6	P7
Leadership	A	.167 (.141)	-.021 (.855)	-.003 (.980)	.249(*) (.027)	.179 (.114)	-.109 (.340)	.157 (.168)
	B	.126 (.270)	.034 (.769)	-.017 (.885)	.020 (.863)	-.060 (.599)	.084 (.461)	.078 (.492)
	C	-.142 (.213)	-.155 (.172)	-.003 (.982)	.192 (.090)	.332(**) (.003)	.193 (.088)	.113 (.321)
	D	.134 (.240)	.130 (.252)	.221 (.050)	.016 (.891)	-.184 (.105)	-.071 (.535)	-.015 (.896)
	E	.302(**) (.007)	-.281(*) (.012)	.014 (.902)	.150 (.187)	-.107 (.349)	-.001 (.990)	-.123 (.281)
	F	.309(**) (.006)	-.195 (.085)	.106 (.354)	.187 (.099)	-.133 (.244)	.083 (.468)	-.159 (.161)
	G	-.088 (.443)	.285(*) (.011)	.185 (.102)	-.017 (.881)	-.050 (.664)	.278(*) (.013)	.061 (.592)
	H	.116 (.308)	-.045 (.692)	.134 (.240)	.146 (.200)	-.345(**) (.002)	-.305(**) (.006)	-.131 (.249)
Supplier Quality Management	SQ1	-.128 (.262)	.224(*) (.048)	.271(*) (.016)	.413(**) (.000)	.022 (.851)	.124 (.276)	-.054 (.638)
	SQ2	.028 (.806)	.071 (.535)	.050 (.664)	.127 (.265)	-.148 (.192)	.102 (.370)	-.123 (.279)
	SQ3	.302(**) (.007)	-.063 (.580)	.037 (.749)	-.105 (.355)	-.174 (.124)	.055 (.631)	-.067 (.559)
	SQ4	-.154 (.177)	.453(**) (.000)	.160 (.158)	.157 (.168)	-.256(*) (.023)	-.297(**) (.008)	-.093 (.417)
	SQ5	.312(**) (.005)	-.017 (.881)	.033 (.776)	-.150 (.186)	-.137 (.228)	.207 (.067)	.103 (.365)
	SQ6	-.225(*) (.046)	.338(**) (.002)	.309(**) (.006)	.260(*) (.021)	-.072 (.528)	-.066 (.562)	-.165 (.147)
Supplier Quality Management	VP1	.053 (.643)	.165 (.147)	.233(*) (.038)	.112 (.324)	.113 (.321)	.217 (.055)	.157 (.167)

	VP2	.172 (.129)	.278(*) (.013)	.296(**) (.008)	.090 (.430)	.149 (.191)	.016 (.888)	.199 (.079)
	VP3	.190 (.094)	.441(**) (.000)	.254(*) (.024)	.215 (.057)	.179 (.115)	.117 (.304)	.013 (.912)
	VP4	.220 (.052)	.237(*) (.035)	.154 (.174)	.263(*) (.019)	.442(**) (.000)	.289(**) (.010)	-.185 (.102)
	VP5	.261(*) (.020)	-.077 (.502)	.219 (.052)	.122 (.282)	-.105 (.358)	.040 (.725)	.120 (.292)
	VP6	-.030 (.790)	-.077 (.501)	.158 (.165)	.327(**) (.003)	-.026 (.817)	.092 (.422)	-.170 (.133)
	VP7	.351(**) (.001)	-.208 (.066)	-.062 (.585)	.123 (.282)	.157 (.168)	-.041 (.718)	.197 (.082)
	VP8	.249(*) (.027)	-.102 (.371)	.146 (.199)	-.243(*) (.031)	-.076 (.506)	.027 (.811)	-.252(*) (.025)

Table: 5.4 "Quality Constructs(1-3) – Product Quality" Correlation

Most of the elements of product quality have very good relation with the Leadership points. But at some points are significantly correlated with each other as Elements of Leadership A & C are significantly correlated with P4 and P5 respectively. i.e, Participation of in quality management and improvement process (A) have the positive effects on the durability of the product (P4). Arranging Employee trainings (E) and discussing quality related issues in meeting (F) are very highly significant with the performance of the product (P1). Whereas with the increase in the education and trainings, decrease in the conformity is shown in the relationship table, which is not natural so it needs to be improved. Top management pursue for long term business success (H) is significantly negative correlated with defect rate of the product (P5).

2. Supplier Quality management

Providing feedback to the vendors (SQ4) is negatively significant correlated with the defects rate (P5) and internal failure cost of the product (P6) as shown in the relationship. Conducting quality audits regularly (SQ6) lowers the performance of the primary product (P1) which is a weak relation but it exists there. One should focus on the auditing procedure, in order to have efficient performance of the product.

3. Vision and Plan Statement

A clear long term vision statement (VP1) is significantly correlated with reliability of the product (P3). VP2 and VP3 are significantly correlated with both P2 & P3, which indicates that encouraging employee's commitment to quality improvement (VP2) and short term business plans (VP3) are moving the product's reliability (P3) and conformity (P2) in right direction. Having clear quality policy (VP4) is significantly correlated with P2, P4, P5 and P6 element of product quality. An inverse relation exists between the involvement of employees in making policies (VP8) and durability (P4), warranty claim cost as percentage of annual sales.

4. Evaluation

Evaluating policies and strategies regularly (E1) is highly significant with the performance of product (P1). As this relation is with positive sign therefore it shows that a direct relation exists between these two. Also E1 is significantly correlated in reverse direction with the durability of the product.

Conducting quality audits regularly (E2) improves the conformity (P2) and reliability (P3) of the product. These quality audits also minimize the warranty claim costs as percentage of annual sales (P7).

363 0.375 value of correlation coefficient between Benchmarking (E3) and performance of the
 364 product (P1) shows that as organization adopt benchmarking practice, performance of
 365 product moves towards positive direction.
 366
 367

Quality Construct	Indicators	Product Quality						
		Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)
		P1	P2	P3	P4	P5	P6	P7
Evaluation	E1	.323(**) (.004)	-.029 (.802)	.059 (.608)	-.355(**) (.001)	.103 (.366)	.117 (.304)	.202 (.074)
	E2	.117 (.305)	.261(*) (.020)	.373(**) (.001)	-.010 (.930)	-.013 (.909)	-.039 (.735)	-.292(**) (.009)
	E3	.375(**) (.001)	-.117 (.305)	-.004 (.971)	.005 (.966)	-.146 (.199)	-.060 (.598)	-.141 (.216)
	E4	.117 (.304)	.272(*) (.015)	.102 (.369)	-.034 (.764)	-.396(**) (.000)	-.070 (.537)	.326(**) (.003)
	E5	.147 (.195)	-.066 (.562)	.202 (.074)	.302(**) (.007)	.067 (.559)	.007 (.955)	.032 (.779)
	E6	.128 (.260)	-.327(**) (.003)	.022 (.844)	.084 (.459)	.014 (.899)	.221 (.050)	-.092 (.421)
	E7	.016 (.886)	.017 (.880)	.075 (.510)	-.104 (.360)	-.144 (.206)	-.139 (.223)	-.011 (.926)
	E8	-.257(*) (.022)	.220 (.052)	.009 (.937)	.303(**) (.007)	-.140 (.217)	-.067 (.558)	-.054 (.638)
	E9	-.150 (.188)	.122 (.283)	.156 (.170)	.150 (.188)	.090 (.429)	.189 (.096)	-.139 (.221)
	E10	-.263(*) (.019)	.111 (.330)	-.014 (.903)	-.008 (.947)	-.065 (.567)	-.101 (.374)	-.241(*) (.032)
Process Control and Improvement	PC1	.189 (.095)	-.111 (.330)	-.129 (.259)	.199 (.078)	-.223(*) (.048)	-.113 (.322)	-.052 (.652)
	PC2	-.058 (.611)	.117 (.303)	.083 (.467)	-.028 (.806)	-.173 (.127)	-.075 (.513)	.022 (.847)
	PC3	.168 (.140)	.502(**) (.000)	.323(**) (.004)	.087 (.447)	-.036 (.751)	.053 (.641)	.022 (.847)
	PC4	.094 (.411)	.143 (.208)	.083 (.467)	.167 (.141)	-.263(*) (.019)	-.252(*) (.025)	-.031 (.788)
	PC5	.133 (.241)	-.165 (.145)	-.024 (.834)	.223(*) (.048)	.004 (.975)	.036 (.751)	.127 (.264)
	PC6	.016 (.889)	-.103 (.366)	-.010 (.927)	.049 (.667)	.029 (.802)	.232(*) (.040)	-.085 (.459)
	PC7	.019 (.867)	.195 (.085)	.269(*) (.016)	.223(*) (.048)	-.122 (.283)	.003 (.976)	-.024 (.831)
	PC8	.005 (.966)	.100 (.380)	.047 (.681)	-.148 (.192)	.062 (.589)	.045 (.693)	.136 (.233)
Product Design	PD1	-.194 (.086)	.263(*) (.019)	.118 (.300)	.249(*) (.027)	-.082 (.471)	.202 (.074)	-.042 (.714)
	PD2	.416(**) (.000)	.098 (.388)	.273(*) (.015)	-.102 (.370)	.109 (.340)	.269(*) (.016)	.299(**) (.007)
	PD3	-.011 (.924)	.291(**) (.009)	.128 (.262)	.061 (.596)	-.168 (.139)	-.183 (.106)	-.033 (.770)
	PD4	.126 (.269)	.194 (.087)	.363(**) (.001)	-.032 (.780)	-.294(**) (.009)	-.151 (.184)	.016 (.888)
	PD5	.225(*) (.046)	.267(*) (.018)	.009 (.934)	-.048 (.676)	-.124 (.277)	.014 (.901)	-.195 (.085)
	PD6	-.214 (.058)	-.225(*) (.046)	-.112 (.325)	.212 (.061)	.268(*) (.017)	.159 (.162)	-.356(**) (.001)
	PD7	-.174 (.125)	.136 (.232)	-.030 (.791)	.193 (.088)	-.125 (.273)	-.156 (.170)	-.084 (.462)
	PD8	-.085 (.456)	.460(**) (.000)	.038 (.738)	.105 (.356)	.209 (.065)	.122 (.283)	.068 (.554)

369 Use of quality related costs extensively (E4) improve conformity rates (P2) and warranty
 370 claim cost (P7) as E4 is significantly correlated with P2 & P7. Also use of quality related cost
 371 (extensively) is significantly negative correlated with the defect rates (P5).
 372 Keeping detailed quality data such as defect rates and scraps (E5) is significantly correlated
 373 with durability of the product (P4).
 374 E6 is significantly correlated with P2 (conformity of product) but this relation is in opposite
 375 direction. i.e, use of quality related data to evaluate the management of the organization is
 376 lowering the conformity of the product.
 377 Use of quality related data to evaluate employee performance (E8) lowers the performance
 378 of the product (P1). Also E8 is significantly correlated with durability of the product (P4).
 379 Purpose of evaluation is improvement (not criticism) is inversely correlated with performance
 380 of the product (P1). This may lead us to a result that evaluation purpose is criticism not
 381 improvement.
 382

383 **5. Process Control and Improvement**

384 Cleanliness situation of the work floor is inversely and significantly correlated with defects
 385 rate of the product (P5). There is room for improvement in the massive situation of shop
 386 floor.
 387 Well maintenance of production equipment/machines (PC3) is significantly correlated with
 388 conformity (P2) and reliability (P3) of the product.
 389 Use of statistical process control tools (PC7) significantly correlated with reliability (P3) and
 390 durability (P4) of the product. Inverse relation exists between incoming, processes, final
 391 product inspection (PC4) and defects rates of the product (P5). It is clear from this inverse
 392 relation that as organization increases inspection at various levels, defects rate unchanged
 393 or increases. Same is case with internal failure costs as a percentage of annual sales.
 394

395 **6. Product Design**

396 Design Engineers with more experience in organization (PD1) is correlated with the
 397 conformity of the product quality (P2) and with parameter of durability of product (P4).
 398 Personnel of product design with marketing experience (PD2) are more significantly
 399 correlated with the performance of product (P1) and also with lesser internal failure cost as
 400 percentage of annual sales (P7).
 401 Considering the customer requirement in new product design (PD3) is significantly
 402 correlated with conformity of product (P2).
 403 Various departments' participation in developing new product (PD4) is significantly negative
 404 correlated with defects rate of the product (P5). Correlation coefficient 0.460 between PD8
 405 and P2 shows that there is significant correlation between the usage of quality function
 406 deployment and conformity of the product quality.
 407

408 **7. Quality System Improvement**

409 Continuous Quality System Improvement (QS1) is significantly correlated with reliability (P3)
 410 and durability of the product (P4). Usage of ISO 9000 as guideline for establishing Quality
 411 System (QS2), documented quality manuals and procedures (QS3, QS4) are inversely

412 correlated with defects rate (P5). A significant correlation exists between having clear quality
 413 manual (QS3), clear working instruction (QS4) and durability of the product (P4).

Quality Construct	Indicators	Product Quality						
		Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)	Corre. Coefficient (p-value)
Quality System Improvement		P1	P2	P3	P4	P5	P6	P7
	QS1	.089 (.433)	.120 (.294)	.255(*) (.023)	.352(**) (.001)	.023 (.841)	.108 (.344)	.000 (.998)
	QS2	.224(*) (.047)	-.205 (.071)	.090 (.431)	.097 (.396)	-.234(*) (.038)	.048 (.674)	-.107 (.347)
	QS3	-.099 (.384)	.307(**) (.006)	.180 (.113)	.346(**) (.002)	-.413(**) (.000)	-.078 (.493)	-.108 (.343)
	QS4	-.210 (.063)	.100 (.381)	.020 (.862)	-.189 (.095)	-.237(*) (.035)	-.243(*) (.031)	-.016 (.886)
	QS5	.105 (.358)	.030 (.792)	.128 (.260)	.423(**) (.000)	.046 (.686)	.251(*) (.026)	-.265(*) (.018)
Employee Participation	EP1	.566(**) (.000)	.036 (.750)	.091 (.424)	-.501(**) (.000)	.185 (.103)	.192 (.091)	.164 (.148)
	EP2	.209 (.064)	.114 (.319)	.301(**) (.007)	.058 (.615)	-.168 (.140)	-.127 (.263)	.272(*) (.015)
	EP3	-.346(**) (.002)	.037 (.745)	.112 (.326)	.571(**) (.000)	.260(*) (.021)	.134 (.239)	-.036 (.751)
	EP4	-.345(**) (.002)	.075 (.512)	-.154 (.176)	.204 (.072)	.353(**) (.001)	.061 (.591)	.100 (.380)
	EP5	.368(**) (.001)	-.160 (.160)	-.055 (.627)	-.014 (.903)	.361(**) (.001)	.256(*) (.023)	.049 (.666)
	EP6	.172 (.130)	.488(**) (.000)	.636(**) (.000)	.232(*) (.040)	-.016 (.891)	.230(*) (.041)	.133 (.241)
	EP7	.017 (.885)	.622(**) (.000)	.441(**) (.000)	.052 (.652)	-.326(**) (.003)	-.023 (.838)	.345(**) (.002)
	EP8	-.158 (.164)	-.249(*) (.027)	-.041 (.721)	.164 (.148)	.370(**) (.001)	.433(**) (.000)	-.016 (.892)
Recognition and Reward	RR1	-.394(**) (.000)	.043 (.707)	.137 (.227)	.331(**) (.003)	.168 (.140)	.176 (.122)	.172 (.129)
	RR2	-.046 (.690)	-.037 (.748)	.100 (.382)	.140 (.218)	.071 (.533)	.150 (.187)	.139 (.223)
	RR3	-.168 (.139)	.162 (.153)	.060 (.599)	.033 (.774)	-.017 (.884)	.044 (.698)	.198 (.081)
	RR4	.165 (.145)	.144 (.206)	-.001 (.990)	-.018 (.876)	-.098 (.391)	-.239(*) (.034)	.357(**) (.001)
	RR5	.208 (.066)	.118 (.302)	.170 (.135)	.261(*) (.020)	-.178 (.116)	-.121 (.290)	-.097 (.395)
	RR6	.157 (.167)	-.286(*) (.011)	-.083 (.465)	.103 (.368)	.290(**) (.009)	.054 (.635)	.055 (.630)
Education and Training	ET1	.161 (.156)	-.117 (.303)	-.148 (.193)	-.121 (.290)	-.010 (.928)	-.097 (.397)	.108 (.341)
	ET2	.142 (.211)	-.135 (.234)	-.009 (.934)	-.390(**) (.000)	-.078 (.497)	-.014 (.901)	.146 (.198)
	ET3	.124 (.276)	.196 (.083)	.314(**) (.005)	.143 (.208)	-.324(**) (.004)	-.073 (.521)	.225(*) (.046)
	ET4	.095 (.407)	.155 (.172)	.337(**) (.002)	.363(**) (.001)	-.256(*) (.023)	-.001 (.994)	-.039 (.731)
	ET5	-.146 (.198)	-.369(**) (.001)	-.102 (.372)	.177 (.120)	.057 (.617)	.016 (.892)	-.080 (.482)
	ET6	-.258(*) (.022)	.180 (.113)	.268(*) (.017)	.404(**) (.000)	-.090 (.433)	.094 (.409)	-.011 (.924)
Customer Focus	CF1	-.104 (.361)	.461(**) (.000)	.150 (.186)	-.266(*) (.018)	.283(*) (.011)	.035 (.757)	.205 (.070)
	CF2	-.041 (.718)	.379(**) (.001)	.369(**) (.001)	.037 (.746)	-.213 (.060)	.041 (.722)	-.219 (.052)
	CF3	.113 (.323)	.262(*) (.020)	.221 (.050)	.208 (.066)	-.037 (.746)	.095 (.407)	-.002 (.986)
	CF4	.028	-.341(**)	-.132	-.010	-.015	.031	.105

		(.804)	(.002)	(.245)	(.931)	(.896)	(.789)	(.358)
	CF5	.106 (.353)	.035 (.758)	.076 (.507)	.226(*) (.045)	.060 (.599)	.047 (.680)	-.175 (.122)
	CF6	-.015 (.895)	.078 (.494)	-.058 (.614)	.046 (.687)	-.210 (.064)	-.053 (.643)	-.042 (.715)

Table: 5.6 "Quality Constructs (7-11) – Product Quality" Correlation

8. Employee Participation

As cross functional teams exist in the organization (EP1), therefore performance of product is fine (P1) but durability of product (P4) very low as there is inverse relation between EP1 & P4. This inverse relation with P4 needs to be reversed. Quality Control Circles (QS2) are significantly correlated with the reliability (P3) of product quality in the organization. Involvement of employees in quality related activities (EP3) and performance of the product (P1) are inversely and significantly correlated. Implementation of suggestion activities in the industry (EP4) is directly and significantly correlated with performance of the products (P1) and also with the defect rate of the product (P5). After evaluation implementation of the suggestion (EP5) is also directly and significantly correlated with the performance and defects rate of the product. Employee's commitment towards the success of the organization (EP6) has direct relation with almost all the factors of product quality construct. Encouraging employees to fix problems they find (EP7) is significantly negative correlated with defect rate of the product (P5).

9. Recognition and Reward

Inverse relation between RR1 and P1 shows that working conditions are not improved in order to recognize employee quality improvement efforts. But RR1 is significantly correlated with durability of product. As excellence suggestions are rewarded (RR4) therefore internal failure cost is less as in column P6.

10. Education and Training

There is inverse relation between the availability of resources for training (ET2) and durability of product. This indicates that the resources are not adequate for the employees. ET3 is significantly correlated with P3 and P7 but inverse with P5. As most employees are trained on quality management tools (ET3) therefore product is more reliable (P3) and warranty claim cost is less. Quality awareness education to employees (ET4) is significantly correlated with reliability (P3) and durability (P4) of product but inversely correlated with defects rates of product (P5). Specific work skill training to employees (ET5) is significantly negative correlated with conformity of product, which shows that specific work skills need to be focused.

11. Customer Focus

Receiving complaints from customer (CF1) is significantly correlated with conformity (P2) and defect rate of the product (P5) but has inverse relation with durability of the product. As quality related customer complaints are entertained with top priority (CF2) therefore it is very much significantly correlated with conformity (P2) and reliability of product (P3). Conducting customer survey each year is significantly correlated with conformity rate of the primary product (P2).

DISCUSSIONS

Compared to the other quality management instruments developed by Saraph et al. (1989), Flynn et al. (1994), and Ahire et al. (1996), the instrument presented in this paper has the highest external validity for manufacturing industries in general and for Chinese manufacturing companies in particular (Zhang et al., 1998).

In this study, data used for testing and validating this instrument only came from 1 textile industry. Firmly speaking, the generalization is limited, although this study was the first one to aim at evaluating the TQM implementation for Textile industries of Faisalabad.

Although this instrument was empirically tested and validated using data from Chinese manufacturing companies, researchers and practitioners from other countries will be able to use it. The reason is that this instrument was developed on the basis of an extensive literature review. However, it should be eminent that findings from this instrument are more valid for Pakistani textile manufacturing industries than for textile industries in other countries.

In summary, The Analysis of variance (ANOVA) table indicates that the score of different elements in all TQM tools are highly significant at 5% level of significance.

4. CONCLUSION

Certifications that the organization holds, are not synchronized with the actual practices within the organization. Out of all negative correlations studied, it is commonly observed that "defect rate of the product" and "internal failure cost as percentage of annual sales" remain one of the factor among negative correlations.

First of all, one should emphasize on above two factors for the betterment of product quality. Then organization has to review following elements of different quality construct for the effective implementation of Total Quality Management practices.

- Long-term business strategy
- Evaluation procedure to examine the performance of Employees / Departments
- Inspection at various stages of the operations
- Involvement of all departments in new product development
- Employee participation in quality relevant decisions
- Working conditions in order to recognize employee quality improvement efforts.
- Market research for improving product performance

Need of the hour is to strictly obey Statistical Process Control (SPC) tools to indicate root cause for the problems and then to take necessary action in the light of quality management systems.

AUTHORS' CONTRIBUTIONS

"Ijaz Ul Hasan' designed the study, wrote the protocol, and wrote the first draft of the manuscript. 'Malik Muhammad Sohail' managed the analyses of the study. 'Javed Latif Piracha' managed the literature searches. Khalil Ahmad performed the statistical analysis. All authors read and approved the final manuscript."

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