QCs' Effectiveness Factors in Public & Private Enterprises in India

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The present study was undertaken in three PSUs and two PSEs from Eastern region to find out the 'factors' critical and responsible for QCs' effectiveness. Both primary and secondary data were collected in three phases during 2004-09 through questionnaire from 236 respondents representing 118 sample QCs. The data so collected were analyzed by PCA under FA with relevant validity analysis. Twenty-one and eleven 'factors' were extracted by this study as critical and responsible for QCs' effectiveness in sample PSUs and private sector enterprises respectively. Although the success and effectiveness measure varies between the organizations and QCs, these 'factors' would act as the catalyst of QCs' effectiveness in any type of industrial setting within this region.

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Introduction

Major environmental changes in late 1980s and early 1990s, such as liberalization policy, encouraged many Indian organizations to explore and experiment with work innovations and quality improvement initiatives in order to improve productivity and quality as well as to satisfy the psychological growth needs of people better. One such initiative is the Quality Circles (QCs). Hutchins (1985) observed, "Quality Circles are the most exciting and profound approach to have been established in the world since the advent of scientific management". As an approach to participative management, QC philosophy incorporates the idea that employees at all organizational levels want to be involved in decisions that affect their work, and, that those closest to a given job are in the best position to evaluate its problems and suggest potential solutions. Presently, QCs represent the dominant form for involving employees in improving manufacturing

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performance in various types of enterprises, irrespective of Public Sector Units (PSUs) or Private Sector Enterprises (PSEs), all over India including Kolkata and suburbs.

Though originally developed in the USA in the 1940s, the QC movement was formally introduced in Japan way back in 1962. In India, the QC movement was started in 1981 in the Ramchandrapuram Unit of Bharat Heavy Electricals Ltd. (BHEL) (Udpa, 1986). Since then, QCs have spread to many types of organizations all over India. In Eastern India, QC movement came into force with its successful implementation in Durgapur Steel Plant (DSP), Durgapur in 1991-92. Some other notable PSUs and PSEs from Kolkata and suburbs practicing QC philosophy include National Thermal Power Corporation (NTPC) Ltd., Farakka; Garden Reach Shipbuilders & Engineers (GRSE) Ltd., Kolkata; Exide Industries Ltd. (EXIDE), Haldia; Mitsubishi Chemical PTA India/MCC PTA India Corporation Pvt. Ltd. (MCPI), Haldia; West Bengal State Electricity Board (WBSEB), Kolkata; Kolkata Port Trust; etc. But QC's implementation does not guarantee effectiveness. It is therefore necessary to assess the factors responsible for the effectiveness of this organizational tool individually for PSUs and PSEs and comparatively in between such organizations.

The sample industrial enterprises in and around Kolkata selected for this study include three PSUs (DSP, Durgapur; GRSE Ltd., Kolkata and NTPC Ltd., Farakka) and two PSEs (EXIDE, Haldia and MCPI, Haldia). All of them have a history of successful and effective implementation of QC philosophy and QC practices for the last ten years. Many of the sample QCs have also been working for many years now.

Objectives of the Study

This empirical comparative study has the following objectives:

- Determine the criteria for assessing QCs' effectiveness based on literature survey and develop a model relevant for both PSUs and PSEs.
- Use the QCs' effectiveness model to develop a questionnaire and conduct a survey among the selected PSUs and PSEs in and around Kolkata.
- Extract the factors by using Principal Components Analysis (PCA) under Factor Analysis (FA) separately for PSUs and PSEs. This would help to find out the factors that have been responsible for QCs' effectiveness in such organizations as studied.
- Compare the model developed with the separately extracted factors for effectiveness.
- Recommend the requisite factors indispensable for QCs' effectiveness and suggest necessary steps for sample PSUs and PSEs to develop the QCs and QC movement further.

Methodology

The literature on workers' participation and QCs was surveyed extensively

to develop the QCs' effectiveness model relevant for both PSUs and PSEs of twenty-five factors. Thereafter, primary and secondary data were collected from 2004 to 2009 in three phases from sample PSUs and PSEs in and around Kolkata, using a range of techniques- focused one-to-one interviews, group interviews, observations, survey questionnaires (both pilot and final) and verification (or checking) of the documentary sources/evidence in regard to the QCs in operation.

Based on the primary data collected and the observations on the prevalent QCs activities in sample PSUs and PSEs in phase I, the questionnaire was developed for pilot survey in phase II. During phase II, the pilot survey questionnaire was administered among the QCs' members and leaders/deputy leaders (50% of sample QCs and its members were included) comprising 118 statements. Thereafter, a thorough analysis of the responses of pilot survey questionnaire was used to eliminate the less important statements for the final questionnaire survey in Phase III. In Recommendations of Guilford (1952) have been followed that at least three statements representing each factor of the QCs' effectiveness model (as developed initially) should be kept in the final survey questionnaire balanced with reliability estimation.

In phase III, the final questionnaire (comprising 96 statements and other general questions, totaling 100 questions) survey was conducted among 236 (214 from PSUs and 22 from PSEs) respondents (representing 118 QCs, i.e., two members from each QC, selected on a stratified basis and as per their availability) for further investigation and analysis of the QCs' effectiveness model. Only those active QCs which were more than two years of age (i.e., the honeymoon effect has gone) and solved at least two problems were selected. The questionnaire used a 5-point Likert Scale, ranging from 'Strongly Disagree' (=1) to 'Strongly Agree' (=5), to obtain primary data from the respondents. In this study, PCA under FA has been taken to find out the most significant (principal components) and influential factors as prevalent separately in sample PSUs and PSEs for making their QCs effective.

Literature Review

The literature on QCs has been largely non-empirical in nature involving successful and unsuccessful stories from varied organizational settings all over the world. Many formal studies on QCs deal with selected aspects of their implementation, outcomes and success or failure factors. This study has focused mainly on success or failure factors of QCs in the works of Dale (1984); Dale & Lees (1985); Ingle (1982); Lawler & Mohrman (1985); Mento (1982); Park (1991); Sen (2010); Sillince, Sykes & Singh (1996); Sodhi & Joshi (1995); Udpa (1986); White & Bednar (1983); etc.

In Indian context, QC implementation process and activities in different organizations (Dwivedi, 1987; 1987a; Jha, 1997; Mathew, 1985; Srinivasan, 1991; Udpa, 1985) and QCs' effectiveness evaluation in industrial settings (Dwivedi, 1987b; Khan, 1986; Vijaya Banu, 2007)

were studied. However, no regional study of this kind in and around Kolkata was found. Hence, this study would be one of pioneering nature within this region. But many of the findings could as well be true of other regions or organizations in India.

The QCs' Effectiveness Model

In Japan, it has been reported that only 40 percent of organizations having QCs have been able to claim 100 percent effectiveness in QCs' working. In case of failure, causes must be identified and remedial measures should be taken to reactivate dormant QCs. It is also imperative for industrial enterprises (including the sample ones) and their managers to know and avoid these causes. Also, in case of success, the factors present and responsible should be identified and standardized. With this objective in mind, a model of QCs' effectiveness factors has been developed for further investigation and analysis.

The QCs' effectiveness model [twenty-five factors] includes:

- Top management commitment and support
- Organizational requirements and support
- Middle management commitment and support
- Employees' attitude and objectives in joining QCs
- Facilitators' commitment and support
- No resistance from trade union
- QCs members' commitment and support
- Provision of comprehensive training
- A minimum level of education, skills and knowledge of QC philosophy
- Main focus on voluntary participation approach
- Strong group dynamics
- Effective leadership in QCs
- Satisfaction with job and non-job factors in the workplace
- Adequate number of suitable problems/projects for QC
- Selection of simple problems/projects for QCs
- Regularity of QCs meetings and QCs activities
- Free-flowing and effective communication system
- Clear-cut QC objectives and logical expectations from QC groups
- Publicity and recognition by management
- Suitable reward schemes/system
- Maintenance of initial enthusiasm and spirit in spite of age of QC
- Taste of success with existing QCs
- Supportive national, local and social culture
- Continued presence of key personnel

- Procedural effectiveness in implementing QCs' solutions/recommendations

Empirical Study & Findings

In this study, PCA and Varimax Rotation with Kaiser Normalization methods (under FA) were applied to the responses of the sample respondents from PSUs and PSEs separately. Tables 1 and 2 contain the twenty one and eleven 'Factors' respectively for the three PSUs and two PSEs.

The FA procedure automatically identifies factors that explain more variance than individual statements. The twenty one and eleven 'Factors' respectively in Tables 1 and 2 have accounted for 82.7 percent (for three PSUs) and 100 percent (for two PSEs) of the total variance among the statements, which have been quite satisfactory. Using the criterion of Eigenvalues greater than one, followed by varimax rotation and a screen-test, those twenty one and eleven 'Factors' have been identified. Due to the sample size, only variables (each represent a particular statement in the final questionnaire) with a factor loading of .600 or higher have been selected.

Table 1 The QCs' Effectiveness Factors (in respect of three PSUs) Based on PCA under FA

ITEMS (COMPONENTS)	LOADINGS
Factor 1: Maintenance of Initial Enthusiasm and Spirit in spite of Age of QC	(28.151%)
89. Still now our QC is a 'staff/QC members' expectation' not 'management expectation'.	.863
93. The QC philosophy has been integrated into the main stream of organizational policy framework in our organization.	.818
46. Our QC facilitator is the main driving force/inspiration behind our QC's successes and effectiveness.	.806
58. Our top and/or middle management always has/have a strong belief in our QC's successes and effectiveness.	.801
44. Our QC facilitator is a mentor/guide to us at all points of time (both difficult and easy).	.793
59. I think that the QC philosophy has now become an indispensable part of our daily work-life and also family life.	.763
Factor 2: Regularity of QCs Meetings and QCs Activities	(6.676%)
13. We have a written QC Code of Conduct to follow for all QC activities.	.771
81. Our QC meetings and all other QC activities are held as per the framed QC Rules and written QC Code of Conduct.	.746
Factor 3: Provision of Comprehensive Training	(5.678%)
4. I think that such formal QC training has developed our general knowledge-base and skills (such as, technical, work-related, group dynamics, leadership, communication, etc.) level than before joining the QC activities.	.912
2. We have been provided suitable and adequate training in all the steps of QC activities and QC philosophy.	.785
5. I think that such suitable and adequate training is absolutely essential to be successful and effective in QC activities.	.777

Factor 4: Keeping the Main Focus on Voluntary Participation Approach	(4.878%)
96. In our organization, we have volunteered to participate in the QCs' activities and also have selected our leader/leaders without any type of management interferences.	.904
Factor 5: No Regular Rotation of QCs Members	(3.841%)
51. I think that regular rotation of members is absolutely essential to make the QC problem-solving process successful and effective.	.842
49. Our QC members are regularly turned over/transferred.	.793
Factor 6: Participative Leadership Style of the Top Management	(3.696%)
16. Our top management always takes our suggestions/recommendations in most of the activities in relation to our work-area/unit/department.	.757
Factor 7: Active Involvement and Commitment from the Departmental Heads/ Supervisors	(3.157%)
21. Our departmental head/supervisor, may or may not be acting as the facilitator of our QC, but is present in most of our QC meetings.	.788
Factor 8: QCs' Members Psychological Development	(2.983%)
70. After joining QC my commitment towards productivity and regularity in work has been enhanced.	.830
54. I have become much more motivated and satisfied after joining QC than earlier.	.807
Factor 9: Continuous Technical Support from the Departmental Heads/ Supervisors for QCs activities	(2.526%)
25. Our departmental head/supervisor, may or may not be acting as the facilitator of our QC, but always help in the preparation of speeches and PowerPoint presentations for all types of QCs Competitions.	.724
Factor 10: Free-Flowing and Effective Communication System in QCs	(2.388%)
63. We freely discuss all QC matters in formal (QC meetings) and informal discussions in our QC.	.612
Factor 11: Successful QCs' Leadership Tenure	(2.338%)
34. I enjoy the power status, authority-responsibility position and recognition in my QC leadership tenure.	.883
35. The success as a QC leader has given me the necessary boost and experience to tackle future situational problems anywhere.	.857
Factor 12: Facilitators' Commitment and Support	(2.232%)
43. If we have any doubt about the QC philosophy, activities, steps, etc., we first go to our QC facilitator.	.720
Factor 13: Middle Management Commitment and Support	(2.119%)
19. We get regular and continuous training and suggestions to improve ourselves in QCs activities from our middle management/departmental head/supervisor.	.801
18. I have joined the QC activities because of the active involvement and inspiration of our middle management/departmental head/supervisor.	.791
Factor 14: Taste of Success with Existing QCs	(1.831%)
71. The successes and recognition of earlier QCs and their members through QCs activities and movement have encouraged and motivated employees like me to join a QC.	.758

Factor 15: QCs' Members Communicational Ability and Skills Development	(1.714%)
85. My active participation in QC activities all these years has improved my communication ability and skills individually and within groups in QC.	.758
Factor 16: Effective Leadership in QCs	(1.651%)
66. Our QC leader is supportive, non-directive and non-evaluative.	.983
67. We always approach our QC leader first whenever we face any problem in QC activities for his/her suggestions/advice and mostly he/she listens to us carefully.	.982
Factor 17: Existence of Other Quality Improvement Programmes in the Past and/or in Present	(1.487%)
14. Our organization had/has Quality Improvement Programmes, such as, Work Councils, Suggestion Schemes/Systems, other WPM Programmes, TQM, Quality Assurance/Control, etc. in the past or currently working simultaneously with the QCs.	.877
Factor 18: QCs Members' Commitment and Support	(1.448%)
57. We maintain all the QC-related records (such as, Minutes Book of QC meetings, QC-Records Book, etc.) on our own.	.632
Factor 19: Selection of Simple Problems/Projects for QCs	(1.361%)
78. The complex nature of QC-selected problems which require inter-departmental, inter-work-area assistance has never stopped the functioning of our QC or made us demotivated to continue the QC activities.	.740
Factor 20: QCs' Stability Throughout Their Tenure	(1.317%)
95. In the past, on one/some/many occasions, our QC had/has been split to form new QCs.	.746
Factor 21: Employees' Attitude and Objectives in Joining QCs	(1.237%)
32. I think that the QC is a medium to show my creativity and other intrinsic qualities, such as, intelligence, organizational and leadership abilities, decision-making skills, etc. before the management/superiors.	.900

Table 2 The QCs' Effectiveness Factors (in respect of two PSEs) Based on PCA under FA

ITEMS (COMPONENTS)	LOADINGS
Factor 1: Regularity of QCs Meetings and QCs Activities	(21.318%)
13. We have a written QC Code of Conduct to follow for all QC activities.	.934
Factor 2: Organizational and Top Management Support for QCs Activities	(15.872%)
9. Our QC regularly participates in different intra-organizational, local, zonal, national and international (if selected) QCs Competitions.	.972
10. For and during all such QCs Competitions (of all types), the expenses for participation, journey, hospitality, recreational tours, additional D.A.- if any, etc. are fully borne by our organization.	.972
69. Our QC success stories are regularly publicised in notice boards, in-house journals, local media, etc.	.926
Factor 3: Middle Management Commitment and Support	(15.049%)
19. We get regular and continuous training and suggestions to improve ourselves in QCs activities from our middle management/departmental head/supervisor.	.966

21. Our departmental head/supervisor, may or may not be acting as the facilitator of our QC, but is present in most of our QC meetings.	.958
Factor 4: Provision of Comprehensive Training	(11.374%)
2. We have been provided suitable and adequate training in all the steps of QC activities and QC philosophy.	.939
4. I think that such formal QC trainings have developed our general knowledge-base and skills (such as, technical, work-related, group dynamics, leadership, communication, etc.) level than before joining the QC activities.	.939
5. I think that such suitable and adequate training is absolutely essential to be successful and effective in QC activities.	.939
Factor 5: Supportive National, Local and Social Culture	(9.652%)
92. I think that the local and social culture supports the QC philosophy in our organization.	.860
59. I think that the QC philosophy has now become an indispensable part of our daily work-life and also family life.	.820
Factor 6: Facilitators' Commitment and Support	(7.521%)
44. Our QC facilitator is a mentor/guide to us at all point of time (both difficult and easy).	.772
46. Our QC facilitator is the main driving force/inspiration behind our QC's successes and effectiveness.	.772
Factor 7: No Resistance from Trade Union	(5.897%)
47. Union members actively participate in our organizational QC movement from the initial stages (acting as QC members in some/many QCs).	.861
***Factor 8: Regular Active Participation of All QCs Members in QCs Activities**	(4.496%)
*64. All of us regularly participate in all the QC activities.	*.567
Factor 9: Employees' Attitude and Objectives in Joining QCs	(3.936%)
77. At the beginning of our QC tenure we were much more interested in solving our personal grievances (such as canteen, restroom facilities, etc.) in the work-related areas.	.948
Factor 10: QCs Members' Commitment and Support	(2.658%)
36. I think that the QCs develop our group, departmental and organizational unity and cohesiveness.	.771
57. We maintain all the QC-related records (such as, Minutes Book of QC meetings, QC-Records Book, etc.) on our own.	.752
39. I believe that rotational leadership approach is best suited for the QC philosophy.	.675
Factor 11: Effective Leadership in QCs	(2.228%)
66. Our QC leader is supportive, non-directive and non-evaluative.	.990
67. We always approach our QC leader first whenever we face any problem in QC activities for his/her suggestions/advice and mostly he/she listens to us carefully.	.990

*Though the factor loading is less than 0.60, this researcher has taken it as a 'Factor' discretionally for its assumed importance in the overall analysis.

With regard to three PSUs, where employment is more or less secure, it was found that lesser work-pressure, free mind in workplace, independence of thinking and working, achievement of the basic needs (as per the different Motivation Theories), etc. have prompted grass-root and middle level workers, as well as the middle level managers to work whole-heartedly for the QCs and maintain the initial enthusiasm and spirit in spite of age of QC [Factor 1 with the highest variance of 28.15% (Table I)], mainly for the purpose of self and mutual development. The PSUs-specific effectiveness factors, such as, 'Keeping the Main Focus on Voluntary Participation Approach'; 'No Regular Rotation of QCs Members'; 'QCs' Members Psychological Development'; 'Active Involvement and Commitment from the Departmental Heads/Supervisors'; 'Successful QCs' Leadership Tenure'; 'Continuous Technical Support from the Departmental Heads/Supervisors for QCs activities'; 'QCs' Members Communicational Ability and Skills Development' and 'Free-Flowing and Effective Communication System in QCs' can be cited as evidence for the above fact.

The sub-factor (representing statement no. 89) under Factor 1 with the highest factor loading of .863 in Table I points towards the fact that QCs have been thriving in three PSUs as the members have been running the whole process without any type of management interference in line with the essence of the QC philosophy. The sub-factor (representing statement no. 93) under Factor 1 with the second highest factor loading of .818 in Table 1 points towards one of the most critical findings of this research (and also a suggestion for other enterprises to implement it). The QC philosophy has been integrated into the mainstream of organizational policy framework in three PSUs, which makes the QCs more successful and effective than their private counterparts. However, on the basis of observations, it could be pointed out that except DSP, Durgapur, no other sample organization has been fully successful in this regard till December, 2009. The sub-factor (representing statement no. 59) under Factor 1 with the sixth highest factor loading of .763 in Table I indicates that the QC philosophy has become an indispensable part of daily work-life and family life of QCs' members. This has made QCs effective in three PSUs.

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The sub-factors (representing statement no. 46 and 44) under Factor 1 with the third and fifth highest factor loadings of .806 and .793 respectively in Table I indicate the importance of the inspirational and mentor-role of QCs' facilitators at all times in maintaining the initial enthusiasm and spirit in spite of the age of QC. Another sub-factor (representing Statement No. 58) under Factor 1 with the fourth highest factor loading of .801 in Table I indicate the strong belief the

top and middle management have about the successes and effectiveness of the QCs. This point was clearly observed by the researcher during his visits to the sample PSUs. The initial failures of many QCs were ignored and continuous encouragement was given to QCs for future improvement. This ultimately caused the number and stature of the successful and effective QCs to grow over time.

Another very important factor [Factor 6: Participative Leadership Style of the Top Management (Table I)] which has been quite unique to PSUs in this region was also actually observed in the three sample PSUs. The sub-factor (representing statement n. 16) under Factor 6 with the highest factor loading of .757 in Table I indicates that top management in the three PSUs has been quite liberal in their leadership style and approach which has helped QCs become effective and retain stability in the long-term.

Factor 14 (Table I) is labeled as the 'Taste of Success with Existing QCs', since it measures the successes and recognition out of successful QCs' efforts which encourage and motivate others to join QCs. The sub-factor (representing statement no. 71) under Factor 14 with the highest factor loading of .758 in Table I points out to the above fact. Some other PSU-specific QCs' effectiveness factors such as, 'Existence of Other Quality Improvement Programs in the Past and/or in Present'; 'QCs' Stability Throughout Their Tenure' and 'Selection of Simple Problems/Projects for QCs' are pointers to the organizational and QCs'-specific effectiveness factors for the three sample PSUs.

With regard to the two sample PSEs, along with the common 'Factors', some indispensable organization-specific factors were also observed. One such critical factor has been the 'Supportive National, Local and Social Culture' (Factor 5, Table 2). The sub-factor (representing statement no. 92) under Factor 5 with the highest factor loading of .860 in Table 2 points to the prevalence of supportive local and social culture within this region (i.e., Haldia, as both EXIDE and MCPI are from this region) which has made QCs effective. Local people have been very committed to their work and to any new intervention or approach. The sub-factor (representing statement no. 59) under Factor 5 with the second highest factor loading of .820 in Table 2 also points to the commitment and support of QCs' members from the two PSEs as they followed the QC philosophy in their regular work-life and family life. It was obvious that they have been getting the active support of family members in this task. This is in itself evidence of the rightly-named Factor (i.e., Factor 5).

Another very critical factor in the IR scenario of West Bengal and especially in Haldia, has been the 'No Resistance from Trade Union' (Factor 7, Table 2). The sub-factor (representing statement no. 47) under Factor 7 with the highest factor loading of .861 in Table 2 points to that the union members have been actively participating in QCs and in the QC movement in the two sample PSEs of this study. It was also found that the QC philosophy

had never roused any suspicion or resistance from the trade unions of those enterprises. This helped to make the QCs effective and the movement easy in those sample PSEs. It was also found that the top management of these enterprises had been continuously supporting the QCs and their members in all regards (Factor 2 with 13.703% variance, Table 2) which helped them become effective. This allowed QCs' members to participate regularly in the QCs' activities.

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Seven 'Factors'

- Regularity of QCs Meetings and QCs Activities
- Facilitators' Commitment and Support
- Provision of Comprehensive Training
- Middle Management Commitment and Support
- Effective Leadership in QCs
- Employees' Attitude and Objectives in Joining QCs
- QCs Members' Commitment and Support

These have been found in the separately extracted 'Factors' for the three PSUs and two PSEs respectively (Tables 1&2). So, it can be concluded that these 'Factors' have been the most indispensable ones for QCs' effectiveness in the sample industrial enterprises. It can be seen from Table 3 that most of the factors of QCs' effectiveness model have matched (partially or fully) with that of separately extracted 'Factors' for the sample PSUs and PSEs. This itself points to the relevance of the model proposed in this study.

The Cronbach Alpha estimate is appropriate for the reliability (Henson, 2001). This estimate was found to be .8778 and .6294 for the three sample PSUs and two PSEs respectively. The standard thumb rule is that the Cronbach Alpha must be greater than .60 to conclude that the scale is reliable. Thus, in case of total items (statements), the scale has been found to be reliable in both the cases.

Conclusion

It was found that QCs' effectiveness was variable across the sample organizations and QCs. In most of the sample organizations (except DSP and EXIDE), the overall QC movement shows a declining momentum. There is evidence that QCs' effectiveness is conditional on and/or influenced by the overall organizational culture, wider participative structures, management intentions and so on. Also, neither employee loyalty and commitment nor employee satisfaction with QCs has been uniform even in the same organization.

In two of the sample organizations, i.e., DSP and EXIDE, it was found that the members as well as non-members are very excited and enthusiastic with the QC philosophy and activities. In some other sample organizations, i.e., NTPC Ltd.,

Table 3 The Proposed Indispensable Factors under the QCs' Effectiveness Model Vs.

The Extracted 'Factors' based on PCA under FA Results for PSUs and PSEs

25 Proposed Indispensable Factors under the QCs' Effectiveness Model	21 Extracted 'Factors' Resulting from the PCA under FA for PSUs	11 Extracted 'Factors' Resulting from the PCA under FA for PSEs
Factor 1: Top Management Commitment and Support	Present Partly (under Factor 6)	Present Partly (under Factor 2)
Factor 2: Organisational Requirements and Support	Present Partly (under Factor 17)	Present Partly (under Factor 2)
Factor 3: Middle Management Commitment and Support	Present (Factor 13), Present Partly (under Factor 7 & 9)	Present (Factor 3)
Factor 4: Employees' Attitude and Objectives in Joining QCs	Present (Factor 21)	Present (Factor 9)
Factor 5: Facilitators' Commitment and Support	Present (Factor 12)	Present (Factor 6)
Factor 6: No Resistance from Trade Union	**Not Present**	Present (Factor 7)
Factor 7: QCs Members' Commitment and Support	Present (Factor 18), Present Partly (under Factor 8), Present Partly (under Factor 15)	Present (Factor 10), Present Partly (Factor 8)
Factor 8: Provision of Comprehensive Training	Present (Factor 3)	Present (Factor 4)
Factor 9: A Minimum Level of Skills, Education and Knowledge of the QC Philosophy	**Not Present**	**Not Present**
Factor 10: Keeping the Main Focus on Voluntary Participation Approach	Present (Factor 4)	**Not Present**
Factor 11: Strong Group Dynamics	**Not Present**	**Not Present**
Factor 12: Effective Leadership in QCs	Present (Factor 16)	Present (Factor 11)
Factor 13: Satisfaction with Job and Non-Job Factors in the Workplace	**Not Present**	**Not Present**
Factor 14: Adequate Number of Suitable Problems/ Projects for QCs	**Not Present**	**Not Present**
Factor 15: Selection of Simple Problems/Projects for QCs	Present (Factor 19)	**Not Present**
Factor 16: Regularity of QCs Meetings and QCs Activities	Present (Factor 2)	Present (Factor 1)

Factor 17: Free-Flowing and Effective Communication System	Present Partly (under Factor 10)	**Not Present**
Factor 18: Clear-cut QC Objectives and Logical Expectations from QC Groups	**Not Present**	**Not Present**
Factor 19: Publicity and Recognition by Management	**Not Present**	**Not Present**
Factor 20: Suitable Reward Schemes/System	**Not Present**	**Not Present**
Factor 21: Maintenance of Initial Enthusiasm and Spirit in spite of Age of QC	Present (Factor 1), Present Partly (under Factor 20)	**Not Present**
Factor 22: Taste of Success with Existing QCs	Present (Factor 14), Present Partly (under Factor 11)	**Not Present**
Factor 23: Supportive National, Local and Social Culture	**Not Present**	Present (Factor 5)
Factor 24: Continued Presence of Key Personnel	**Not Present**	**Not Present**
Factor 25: Procedural Effectiveness in Implementing QCs' Solutions/Recommendations	**Not Present**	**Not Present**

Farakka and MCPI, Haldia, excessive work pressure is causing less time available for QCs' activities.

The primary contribution of this study has been to develop a new organization-oriented QCs' effectiveness model which is also time-tested. It has tracked the responses of the respondents to QCs-participation over time (during three phases). It has used the FA logically and reliably for extracting 'Factors' based on the primary data. It has employed a comparative analytical study (QCs' effectiveness model vs. the separately extracted 'Factors'). This study was also not a mere narrative of some organizational participants or self-reported by either the management or the unions.

Limitations

This study is not free from limitations. Time and resource constraints make this study limited in numbers and dimensions. Future research should include self-reported and other types of primary data (including questionnaire study) in examining QCs' effectiveness in terms of the QCs' problem solving and QCs' productivity. Future research could also cover inter-regional studies making a comparative analysis of QCs' effectiveness factors in PSUs vs. PSEs in other regions of the country.

The following are suggested and recommended as indispensable prerequisites/factors as essential for the sustained long-term success and effectiveness of individual QCs and the overall QC movement in different organizations (irrespective of their nature):

1. The QC philosophy should be integrated in to the basic organizational structure

and policy framework. Also, the organizations need to capture and follow the true spirit of the QC philosophy in all regards.

2. The commitment and positive attitudes of the immediate boss, acting as facilitator, and the wholeheartedness and drive of the respective QCs' members are most crucial in making the QCs effective.

3. Prior to the introduction of the QCs, comprehensive training schedules should include awareness sessions, skills-development sessions and practical sessions.

4. A separate QC Cell should be developed (possibly under the aegis of the TQM/Quality Control/any other Department, as in DSP, Durgapur) to look after QC efforts in the organization.

5. QCs' success and effectiveness should not be judged only from performance in different QCs competitions, but, rather from the importance of the solutions/recommendations for problems in their respective work-areas. More and more emphasis should be put on regular visits by management (top and middle) to QCs' work-areas to verify the progress of QCs activities and obtain necessary feedback from QCs members.

6. Lucrative monetary reward schemes/systems based on a percentage of the total money saved (post-audit) should be offered to QCs members to motivate them further, though, this violates the basic QC philosophy. This would be much more logical, scientific and attractive than the existing one-time 'Cash Award' schemes as generally prevalent in the sample PSUs and PSEs.

7. The top and especially middle management should be responsible and accountable for the all-round arrangements necessary for QCs' effectiveness and should show keen interest and drive to make the QC movement successful and effective in the respective organizations.

8. The leadership provided to individual QCs and to organizational QC movement is also very critical for and influential in maintaining the initial enthusiasm and regularity of QCs' meetings and activities for achieving QCs' effectiveness.

9. All organizations practicing and wanting to introduce/launch the QC philosophy should be focused on improving the QWL and social and family life of the QCs members as a priority.

In conclusion, when properly implemented in the right industrial culture, QCs could help create a competitive drive quite beyond the experience of anyone who has not seen them in operation. However, when badly managed, QCs result in failure, disappointment and cynicism and distrust of the concept of QC (Hutchins, 1985) and could become a management fad (O'Donnell & O'Donnell, 1984).

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