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ABSTRACT

A quality circle (QC) is a group of workers from the same work area who voluntarily meet on a regular basis to identify, analyze, and solve various work-related problems. While management support has been a variable frequently cited as critical to the success of QCs in organizations, very little research has empirically documented the relationship between management support and QC effectiveness. This study was conducted to examine the relationship between top-, middle-, and lower-management attendance and the effectiveness of QCs. The effectiveness of 47 QCs over a 3-year period was examined as a function of management attendance using the archival data of a QC program. The results showed that QCs with a high level of upper-management attendance had a higher attendance rate at QC meetings and had more QC members than had QCs with a low level of management attendance. QCs with a high level of middle-management attendance had attempted more QC projects and had a higher amount of cost savings than had QCs with a low level of management attendance. The effect of lower-management attendance on QC effectiveness was not significant. (Author/NB)

Top-, Middle-, and Lower-Management Attendance and Quality Circle Effectiveness

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Abstract

The effectiveness of 47 quality circles (QCs) over a three-year period was examined as a function of management attendance using the archival data of a QC program. The results showed that QCs with a high level of upper-management attendance had a higher attendance rate at QC meetings and had more QC members than had QCs with a low level of management attendance. QCs with a high level of middle-management attendance had attempted more QC projects and had a higher amount of cost savings than had QCs with a low level of management attendance. The effect of lower-management attendance on QC effectiveness was not significant.

Top-, Middle-, and Lower-Management Attendance and Quality Circle Effectiveness

A quality circle (QC) is a group of workers from the same work area that voluntarily meet on a regular basis to identify, analyze, and solve various work-related problems (Barrick & Alexander, 1987; Ingle, 1982; Lawler & Mohrman, 1985; Tang, Tollison, & Whiteside, 1987c; Rafaeli, 1985). Management support has been one of the many variables most often cited as critical to the success of QCs in organizations (e.g., Cole & Tachiki, 1983; Garvin, 1986; Gibson, 1981; Goodman, 1983; Ingle, 1982; Lawler, 1986; Lawler & Mohrman, 1985; Reiker, 1983; Wayne, Griffin, & Bateman, 1986). However, very little research in the literature has empirically documented the relationship between management support and QC effectiveness. The major purpose of the present study was to empirically examine the relationship between top-, middle-, and lower-management attendance and the effectiveness of QCs in a field study. In the following paragraphs, theories and research related to management attendance and QC effectiveness are briefly reviewed.

Management Attendance

It is reasoned that if the management of an organization supports the QC program, managers will attend QC support (steering committee) meetings and/or QC meetings which will enable them to offer their knowledge, expertise, information, and related resources to those QCs and help them select, coordinate, and solve QC-related problems. Further, a high level of management attendance may lead to a high level of perceived demand characteristics (PDC) (cf. Orne, 1962; Salomon, 1984). One factor which affects the amount of invested mental effort is a person's perceived demand characteristics of the stimulus, task, or context (Salomon, 1984). The more demanding PDC is, the greater amount of mental effort will be expended which, in turn, may lead to a high level of effectiveness and performance.

It is also possible that managers' own involvements in QC-related activities may set an example or role model for QC members, thus, a high level of management attendance may lead to QC members' high involvements in QC activities which can be expressed in terms of QC membership (i.e., QC size), the attendance rate at QC meetings, and the actual performance or problem-solving activities of QCs. These results can be explained, in part, by Bandura's (1977) social learning theory which states that the best explanation of behavior is in terms of continuous, reciprocal interaction between cognitive, behavioral, and environmental determinants.

It is reasonable to believe that upper- and middle-level managers may have more "power" than first-line supervisors in an organization (cf. French & Raven, 1959). Therefore, it is plausible that the attendance of upper- and middle-level managers may pose a high level of perceived demand characteristics to QC members, whereas the involvement of first-line supervisors may pose a low level of perceived demand characteristics to QC members. Further, upper- and middle-level managers may set a good role model for QC workers and have stronger impacts on QC effectiveness, however, the first-line supervisors may not.

Top-Management Attendance

Ingle (1982) pointed out that "top Management involvement in the Quality Circle program is essential in setting up the policy and guidelines" and "helps to promote more funding, participation, guidance, and cooperation throughout the company" (p. 58, emphasis added). Top management personnel's involvement in QC steering committee meetings over time is also "an indicator of the priorities" the individual might have set in their "day-to-day management activities" (Tollison, 1986b, p. 88). Recently, Tang, Tollison, and Whiteside (1986, 1987a; Tollison, 1986a; Tollison, Tang, & Whiteside, 1986) examined the effects of upper-management attendance, circle initiation, and collar color on QC effectiveness. They found that QCs with a high

level of upper-management attendance solved their problems significantly faster than did those QCs with a low level of attendance.

It has been pointed out by Dean (1985) that QC members "apparently have little patience for merely going through the motions--they want results" (p. 326). Dean (1985) further pointed out that the primary interest in becoming a member of a QC and attending QC meeting was probably due to "the circles' potential for improving the work place" (p. 326). This goal can be achieved by QC members, if they are able to solve their problems. It has been suggested also that an important asset of QC membership was that QCs were "sources of both informational and emotional social support" (Marks, Mirvis, Hackett, & Grady, 1986, p. 68). If QC members were not satisfied with their QC-related activities, they probably would withdraw their involvements in QCs.

Top-level managers are usually concerned about the identification of new quality circle teams and the development of policies and procedures for QCs. Thus, top-level managers' attendance at QC steering committee meetings would be highly related to QCs members' motivation to attend QCs.

Hypothesis 1: QCs with a high level of top-management attendance will have higher motivation to attend QC meetings than will QCs with a low level of attendance.

Middle-Management Attendance

Tang, Tollison, and Whiteside (1987b) examined the major differences between active and inactive QCs and suggested that active QCs had a significantly higher level of attendance from the middle management than had inactive QCs. These results were related to the idea suggested by Lawler and Mohrman (1985) that resistance by "middle management" was one of the several "destructive forces" related to QCs' failure (p. 67). It should be pointed out, however, that "lack of resistance" from

middle-management do not necessarily mean "attendance" or "support" of QC activities. Further, it is also plausible that managers who are against QCs may get involved in QC activities in order to establish their control over these QCs. It was reasoned, however, that middle-level managers' attendance in QC activities would have a significant and positive impact on the effectiveness of QCs.

Further, middle-level managers were "invited" to attend QC meetings. The actual number of meetings attended was examined. These managers were invited to attend QC meetings for the following reasons. For example, middle-level managers might be asked to provide technical knowledge, information, and resources in identifying QC problems, selecting QC projects, solving QC problems, and presenting possible solutions to management presentation meetings. Further, costs of project implementation and cost savings were estimated and calculated by these middle-level managers. It was plausible that a good solution might lead to high cost savings. Thus, they might be helpful, informative, and promotive. They might also be summoned by intrusion or a helpful "hint" from management. Managers were mostly invited or excluded according to the circumstance as perceived by the QC members.

It was reasonable to expect that the attendance of middle management might be caused by the demand characteristics. Their presence might also cause a high level of demand characteristics, which in turn, might enhance QC workers' problem-solving activities, namely, the number of projects they had worked on and cost savings. In fact, middle-level managers were invited to attend QC meetings mostly for these two reasons. It was also plausibe that middle-level managers' attendance might help QC members to further develop their problem-solving skills, increase their own involvement of QC activities, the morale of the teams, and set a good role model for QCs.

Hypothesis 2: QCs with a high level of middle-management attendance

will have a significantly higher number of QC projects attempted and cost savings than will QCs with a low level of attendance.

Lower-Management Attendance

In the literature, first-line supervisors have been frequently characterized as men in the middle (Driscoll, Carroll, & Sprecher, 1978; Roethlisberger, 1945; Schlesinger & Klein, 1982). Further, first-line supervisors do not share in the "decision-making process" (Wray, 1949, p. 298), are not a real part of the "company management" (Bittel & Ramsey, 1982, p. 27), and tend to identify more closely with workers than with management (Cole, 1971; Nosow, 1981). Garvin (1986) examined the responses from first-line supervisors in Japan and the U.S. and found that Japanese supervisors "displayed a strong management commitment to quality" (p. 668), whereas U.S. supervisors considered that "quality received far less emphasis than meeting production schedules" (p. 669).

Although first-line supervisors may have the day-to-day contact and direct authority over the QC team members and actually direct the team's effort, they may not have enough "power" (cf. French & Raven, 1959), perceived demand characteristics (PDC) (Salomon, 1984), and may not serve as a role model for members (cf. Bandura, 1977). It was hypothesized that lower management attendance would have no significant relationship with QC effectiveness.

Rafaeli (1985) and Holcomb and Berger (1986) suggested that there was a tendency toward higher satisfaction and positive attitudes with increasing tenure in QCs. It was plausible that QC tenure might have an effect on QC attitudes and satisfaction, which in turn, might have an effect on QC effectiveness. In the present study, several variables were significantly related to QC tenure, thus, besides the use of multivariate analyses of variance (MANOVA), three separate sets of multivariate analyses of covariance (MANCOVAs) using QC tenure as a covariate were performed in

order to determine the extent to which QC tenure would influence the effect of management attendance on QC effectiveness.

Method

The subjects of the present study were 255 employees from 47 QCs of a middle Tennessee structures fabrication and assembly plant. Data were collected over a three-year period. The facility employed approximately 3200 when this project began and over 4600 at its conclusion. Three hundred and sixteen workers (6.8% of the work force) were involved in 53 QCs at the time of the study. The range of circle size varied from 3 to 26 members with an average of 8.5 members per circle over the three-year period. During this time period, 28 circles were formed in the first year, 18 the second year, and 7 the third year. Of these 53 QCs, only 7 had survived for the whole 36 months period. Seventeen QCs died before the end of the third year. The major differences between active and inactive QCs were examined and presented elsewhere (Tang et al., 1987b). Six new QCs were excluded from the present data analyses because they had not completed any QC-related project. Of these 47 QCs, 11 QCs were in the white-collar category, 36 QCs were in the blue-collar category. All blue-collar QCs were unionized. The differences between white- and blue-collar QCs were examined and presented elsewhere (see Tang et al., 1987a).

The average age of workers involved in QCs was 36.8 years old. Their educational level varied from grade school to graduate degrees with an average of 13.12 years of school. The average tenure of QC members with the company was 6.1 years.

Management Attendance

Top-, middle-, and lower-management attendance were operationally defined as follows:

Top-Management Attendance. There was only one steering committee for the QC

program which consisted of the company president, 12 vice-presidents from different areas of a division, and a QC program coordinator. The major purposes of this steering committee were to identify new QCs, develop policies and procedures for QCs, and implement QC projects when accepted. This committee met once a month. However, when the situation called for more meetings they might meet as often as once a week. For example, members of the steering committee might be asked to sit in a management presentation where QC members presented their solutions to a problem or to act upon the implementation of QC projects, then, the steering committee would meet in a meeting. In the present study, only the attendance rate of these 12 vice presidents was included in the calculation. Each vice president had direct responsibility for 2 to 10 QCs in his or her own area.

The percentage of attendance at steering committee meetings reflected top-management attendance and was obtained from steering committee minutes recorded by the quality circle program coordinator. The range of scores for upper-management attendance varied from 40% to 90%. A median split was employed to divide upper-management attendance into high and low groups. The cut-off score was 78. The mean and standard deviation of these variables are presented in Table 1.

Middle-Management Attendance. Middle-level managers were invited to attend QC meetings. The number of meetings they actually attended, i.e., middle-management attendance, was drawn from QC minutes recorded by the facilitator. Since such appearances occured on an ad hoc basis and the rate of attendance was about 100% in most cases, thus such appearances were tallied by the number of occurrences rather than as a percentage. General supervisors, superintendents, managers, directors, vice presidents (from other areas or division), industrial engineers, safety engineers, supervisors from other areas, and technical support personnel were included in the tally. The range of scores for middle-management attendance varied

from 0 to 80. That is, one QC had never invited any middle-level manager to their meetings, whereas the other QC had invited managers to their meetings 80 times. A median split was again used to divide middle-management attendance into high and low groups. The cut-off score was 17.5.

Lower-Management Attendance. Lower-management attendance was reflected as a percentage of the number of QC meetings held where the first-line supervisor was present. This was done because the leadership in QCs was not a very stable measurement, whereas the supervisor of a QC was. Whether or not the supervisor actually served as a leader of the QC was not included as a factor. The range of scores for lower-management involvement varied from 0% to 100%. A high level of attendance might mean that the supervisor attended the QC meetings very often or he or she was the leader of the QC. The score of 88 was used as a cut-off point for a median split. It should be pointed out that management attendance for these three levels of managers was not manipulated by the researchers of the present study.

QC Effectiveness Variables

Motivation to Attend. It has been suggested that the amount of time an individual spent on the target activity during the free-choice period (e.g., Amabile, DeJong, & Lepper, 1976; Deci, 1971, 1975; Lepper & Greene, 1975; Lepper, Greene, & Nisbett, 1973; Tang, 1985, 1986, 1987; Tang & Baumeister, 1984; Tang, Liu, & Vermillion, 1987; Shalley & Oldham, 1985) and his or her willingness to participate in future experiments (cf. Amabile et al., 1975; Staw, Calder, Hess, & Sandelands, 1980) were considered different measures of intrinsic motivation. It should be pointed out also that in the U.S., "QC membership" has been completely voluntary in most organizations. Thus, no employee would be forced to attend QC meetings. Following this line of reasoning, it was reasonable to believe that employees' membership in QCs and their participation in QC-related meetings represented their

motivation to attend QC (cf. Tang, Tollison, & Whiteside, 1987c).

Attendance Rate. QC members' attendance rate at QC meetings was obtained from the QC minutes. Total actual hours of meetings attended across the life of the QC were divided by the total possible hours across the life of the QC to obtain an overall attendance percentage. This measure varied from 54.7% to 92.9%.

QC Size. QC size reflected the number of members in a QC. QC size was examined by averaging the number of QC members across the life of the QC in the three-year period. QC size varied from 3 to 26 members.

Task Peformance. QC facilitators' cumulative project status reports were used to examine QCs' problem-solving activities. The reports were updated monthly and reflected the dates QC projects were started, presented, accepted, implemented, or dropped and whether or not a project report had been filed.

Project Attempted. The number of projects attempted was determined by examining the facilitators' cumulative project status reports. The number of projects attempted varied from 1 to 14 projects.

Project Dropped. The number of projects dropped for each QC was also examined in the present study. The minimum and maximum of scores were 0 and 6, respectively. However, the reasons for dropping the project were not available from the archival data of QC programs.

Rate of Failure. The rate of failure was calculated by dividing the number of projects dropped by the number of projects attempted. The rate of failure varied from 0 to 1.00. Thus, for some QCs, the rate of failure was 100%.

Costs of Implementation. Costs of implementation and cost savings were recorded following each presentation and were tallied over the period of time during which each QC was in operation. Total costs of project implementation reflected estimates submitted to the QC by plant engineering, industrial engineering, or purchasing,

i.e., middle-level managers in the present study. The range of costs varied from 0 to 237,564 dollars.

Cost Savings. Total cost savings reflected labor reduction, efficient materials usage, and machine downtime reduction as determined by QC members and industrial engineers (i.e., middle-level managers) based on the collection of data in various formats. The range of savings varied from 0 to 764,266 dollars. In the present study, costs of implementation and cost savings were not yet available from 3 QCs.

QC Tenure. Finally, QC tenure was defined as the length of time the circle had existed, as expressed in manufacturing days. The minimum and maximum of QC tenure were 37 and 734 days, respectively.

Results

The means, standard deviations, and correlations among variables are presented in Table 1. The major purpose of the present study was to examine the effect of mangement attendance on QC effectiveness. All dependent variables (except QC tenure) were analyzed in three separate sets of multivariate analyses of variance (MANOVAs), using upper-, middle-, and lower-management attendance as the independent variable, respectively (see Table 2). Significiant results were further analyzed by ANOVAs. Further, three separate sets of multivariate analyses of covariance (MANCOVAs) were also performed using QC tenure as a covariate, for upper-, middle-, and lower-mangement attendance, respectively (see Table 3).

Insert Table 1 about here

Top-Management Attendance

It was hypothesized that QCs with a high level of upper-management attendance would have a significantly higher level of motivation to attend than would QCs with a

low level of upper-managment attendance. The results of a MANOVA supported this hypothesis, F (7, 36) = 3.79, p = .004, Wilks lambda = .58. Since the overall MANOVA was significant, thus further univariate F-tests (ANOVAs) were conducted. The results of these ANOVAs showed this difference to reside in members' attendance rate at QC meetings, F (1, 42) = 13.80, p = .001, omega squared = .110 and QC size, F (1, 42) = 11.90, p = .001, omega squared = .180 (see Table 2).

More specifically, attendance in QCs with higher upper-management attendance was significantly higher (M = 83.52%) than in QCs with low upper-management attendance (M = 77.01%). Membership (QC size) in QCs with a high level of management attendance was also higher (M = 10.40) than in QCs with a low level of attendance (M = 7.67).

Further, the results of a MANCOVA showed that the effect of upper-management attendance on QC effectiveness was significant, when QC tenure was treated as a covariate, F (7, 35) = 3.64, p = .005, Wilks lambda = .73 (see Table 3). Thus, the significant relationship between upper-management attendance and QC effectiveness was not affected by QC tenure. The results of Table 3 further revealed that QCs with high top-management attendance differed from QCs with low attendance on QC members' attendance rate, F (1, 41) = 13.88, p = .001, QC size, F (1, 41) = 11.34, p = .002, and the number of projects attempted, F (1, 41) = 7.53, p = .009.

Insert Table 2 and 3 about here

Middle-Management Attendance

It was also hypothesized that QCs with a high level of middle-management attendance would have a significantly higher level of QC effectiveness in terms of the number of projects attempted and cost savings than would QCs with a low level of middle-management attendance. The results of a MANOVA supported the hypothesis, F

(7, 36) = 3.39, p = .007, Wilks lambda = .60. Again, further ANOVAs were performed in order to locate the sources of the significant overall MANOVA. The results of univariate F-tests showed that the effect of middle-management attendance had significant relationships with the number of QC projects attempted, F (1, 42) = 20.55, p = .001, omega squared = .304, and cost savings, F (1, 42) = 5.22, p = .027, omega squared = .088.

The present results suggested that QCs with a high level of middle-management attendance had attempted to solve more QC projects (M = 6.35) than had those with a low level of attendance (M = 2.89). Further, QCs with high management attendance also had a significantly higher amount of cost savings (M = $146,410) than had QCs with low management attendance (M = $40,970). However, when the results were analyzed in a MANCOVA when QC tenure was controlled as a covariate, the same effect failed to reach significance, F (7, 35) = 1.07, p = .401, Wilks lambda = .82 (see Table 3). Thus, the significant impacts of middle-management attendance on QC effectiveness were related to QC tenure.

Lower-Management Attendance

It was predicted that no significant differences would be expected between QCs with a high or low level of lower-management attendance. The results of a MANOVA showed that the effect of lower-management attendance on QC effectiveness failed to reach significance, F (7, 36) = 1.08, p = .398, Wilks lambda = .83. A similar pattern of result was also found in a MANCOVA, F (7, 35) = 1.12, p = .372, Wilks lambda = .82. Thus, lower-management attendance had no impact on QC effectiveness.

Correlational Data

Since the independent variables examined in the present study were not manipulated, the correlations among these variables were examined. The results of Table 1 showed that the three levels of management attendance were not significantly

correlated. Further, upper-management attendance was significantly correlated with the attendance rate at QC meetings and QC membership (QC size). Middle-management attendance was correlated with the attendance rate at QC meetings, the number of projects attempted, cost savings, and QC tenure. However, lower-management attendance was not related to any of these variables.

Further, the attendance rate at QC meetings was associated with QC size. QC tenure was significantly correlated with the number of projects attempted, costs of QC project implementation, and cost savings. QC tenure was negatively correlated with the rate of failure (dropped/attempted). However, QC tenure was not significantly correlated with the number of projects dropped. Therefore, dropping a QC project does not seem to be related to the life of a QC. However, a high rate of failure may be related to the survival of a QC. The number of projects attempted was positively correlated with the number of projects dropped, costs of QC project implementation and cost savings. Finally, cost of implementation and cost savings were positively correlated.

Discussion

One of the strengths of this paper is also related to its weaknesses, namely, the data for the research are archival and not self-report. Therefore, many of the problems that are characteristic of self-report data are absent. A major weakness of the present study is that QCs are not formed randomly, and that they come from areas that have some relationship among them (related by technology, output, etc.). Thus, it will not be the case that observations based upon these units will be independent of one another. Further, some of these QCs may have the same steering committee and consequently the same upper management. Thus, the scores related to upper-management attendance may not be completely indepedent. Given the warnings concerning the weakness of the archival data of QCs, the present study attempts to empirically

document the relationshp between management attendance and the effectiveness of quality circles.

The results of the present study suggest that upper-management attendance, as measured by the attendance rate at steering committee meetings, is significantly related to members' attendance rate at QC meetings, the number of members involved in QC activities, and the number of projects attempted. Further, the relationship between upper-management attendance and motivation to attend is not affected by QC tenure.

It is possible that upper-management attendance is related to QC members' high motivation to attend QCs and problem-solving activities, because QC activities, according to Marks, Mirvis, Hackett, and Grady (1986), are expected to lead to "improved working conditions and greater opportunities for expression and self-development for participating employees" (p. 61). Further, Dean (1985) stated that the desire for greater involvement in the organization and a belief that QCs will be instrumental in solving problems of quality, productivity, and working conditions relate significantly to an individual's decision to join a circle.

Because management attendance was not manipulated by the present researchers, it is also possible that these managerial behaviors may themselves be a product of QC performance and members' active involvements in QC-related activities and not necessarily a cause of it. It is plausible that certain QCs try to work on interesting and important projects. These projects attract more members to get involved in QC meetings which in turn, may have demanded upper management personnel to attend QC steering committee meetings. Further, managers are more likely to attend ering committee meetings if the number of projects and type of projects are consistent with managers' expectations and the projects involved thousands of dolars in costs of implementation and cost savings. The implication here is that upper-level

management may be more likely to attend because of the cost impact; their attendance may not result in greater cost savings.

It is reasonable to expect that upper-level managers have "power" in an organization (cf. French & Raven, 1959), thus, these managers' participation and involvement in QC activities may led to a high level of "perceived demand characteristics" (cf. Salomon, 1984) and may have created a modeling effect for QC members, thus, QC members also have a high level of involvement and participation in QC-related activities (cf. Bandura, 1977). It is suggested that QC members' subjective perceptions and feelings should be measured directly in future studies.

Directors, industrial engineers, safety engineers, managers, and other supporting personnel are invited to attend QC meetings. These middle-level managers may be able to offer their knowledge, expertise, information, and related resources to those QCs and help them select the right QC projects and start the process.

Further, middle-level managers also help QCs calculate the cost savings. Therefore, middle-management attendance may bear a significant relationship to the number of QC projects attempted and costs savings.

It is reasonable to believe that the number of projects QCs attempted and cost savings are accumulative in nature over the years. Therefore, when QC tenure is controlled as a constant, the relationship between management attendance and these two variables disappears. The results of the present study strongly support the notion that QC programs can save the company some money (e.g., Bocker & Overgaard, 1982; Wayne, Griffin, & Bateman, 1986) and middle-management attendance is strongly related to cost savings.

The relationship between lower-management (first-line supervisor) attendance and QC effectiveness is not significant. It is plausible that QC workers may have considered the "first-line supervisor" as "one of us", thus, the presence,

involvement, and visibility of the first-line supervisor do not lead to a high level of perceived demand characteristics and may not create the modeling effect for QC members. It is also possible that lower-level managers may have less "power" than upper- and middle-level managers (cf. French & Raven, 1959), thus, lower-level managers' involvement is not significantly related to QC members' involvement and performance in QCs. It is also very likely that the workers were afraid not to attend but that while they attended they were just going through the motions. However, it is easy to understand that the consequences of social loafing in front of a first-line supervisor, a middle-level manager, and a top-level manager are probably not the same. In the case of a top-level manager, the consequences can be very fatal. Finally, it is plausible that the lack of significant results may be related to the lack of variation on this variable. An examination of the standard deviation of lower-management attendance suggests that this may not be the case. These suggestions can be used to support the notion that first-line supervisors may not been perceived as a real part of the company management (cf., Bittel & Ramsey, 1982; Driscoll et al., 1978; Schlesinger & Klein, 1982).

In the present study, the three different measures of management attendance were not manipulated by the present researchers. Thus, causal assertions may be tempered. Further, the three levels of management attendance reflect management personnel's attendance of QC steering committee meetings and/or QC meetings. There is a big difference between attending steering committee meetings and attending QC sessions. Thus, a direct comparison of two different types of attendance may not be feasible. It is suggested that other forms of management involvement and support, QC members' subjective perceptions of management involvement, support, and the modeling effect should be examined directly in future research.

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Table 1

Means, Standard Deviations, and Correlations Among Variables

Variable	M	SD	2	3	4	5	6	7	8	9	10	11
1. Upper (%)	72.22	13.61	10	15	31*	30*	18	14	-04	11	11	-06.
2. Middle (No.)	23.47	18.72		15	29*	16	36**	11	-18	16	39**	65***
3. Lower (%)	78.51	21.01			19	-17	00	-10	-22	-14	05	12
4. Attendance Rate (%)	81.03	8.82				31*	-15	-18	-07	-05	-08	02
5. QC Size	9.35	2.99					06	06	-05	01	-07	-08
6. Project Attempted	5.13	3.16						55***	00	34*	42**	48***
7. Project Dropped	1.32	1.29							64***	18	20	04
8. Rate (Dropped/Attempted)	.26	.23								-07	-08	-26*
9. Costs of QC Project Implementation (In $1,000)	24.89	40.14									65***	36**
10. Cost Savings (In $1,000)	103.27	157.66										47***
11. QC Tenure (Days)	403.17	210.84										

Note. $N = 47$ (Except variables 9 and 10, $N = 44$). All decimals have been omitted for correlations. *$p < .05$, **$p < .01$, ***$p < .001$.

Table 2

Summary of MANOVA and ANOVAs for Top-, Middle-, and Lower-Management Attendance

Variable	Top	Middle	Lower
	F	*F*	*F*
Overall MANOVA With (7, 36) Degrees of Freedom			
	3.79**	3.38**	1.08
Univariate *F*-Tests (ANOVAs) With (1, 42) Degrees of Freedom			
Attendance Rate	13.80***	.05	.42
QC Size	11.90***	.36	2.62
Project Attempted	2.40	20.25***	.94
Project Dropped	2.08	2.20	.20
Rate of Failure	.48	2.62	.02
Cost of Implementation	.07	2.70	3.64
Cost Savings	.02	5.22*	.64

Note. $*p < .05$, $**p < .01$, $***p < .001$.

Table 3

Summary of MANCOVA and ANCOVAs for Top-, Middle-, and Lower-Management Attendance

Variable	Top F	Middle F	Lower F
Overall MANCOVA With (7, 35) Degrees of Freedom			
	3.64**	1.07	1.12
Univerate F-Tests (ANCOVAs) With (1, 41) Degrees of Freedom			
Attendance Rate	13.88***	2.86	.01
QC Size	11.34***	3.78	4.10*
Project Attempted	7.53**	2.07	.04
Project Dropped	2.67	.18	.00
Rate of Failure	.36	1.07	.02
Cost of Implementation	.01	.02	1.99
Cost Savings	.01	.08	.00

Note. *$p < .05$, **$p < .01$, ***$p < .001$.