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SUCCESS FACTORS FOR THE EFFECTIVE IMPLEMENTATION OF TOTAL QUALITY MANAGEMENT (TQM) IN THE MAINTENANCE OF UNIVERSITY BUILDING

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The paper examined success factors enhancing the effective implementation of TQM in the maintenance of university buildings in South Africa. The study further investigated the existence of a statistical difference in workers' affiliated campuses, workers' positions and their perception of the factors that ensure successful implementation of TQM in the maintenance of university building facilities. The study adopted a case study approach and purposive sampling method was used to select 71 participants and respondents for the study. Questionnaires with closed-ended questions were distributed to workers in the maintenance department in a university across five campuses. Descriptive and inferential statistics were used to analyse the data. It was revealed that TQM success factors were extensively practiced with respect to training and education of maintenance workers, use of statistical methods, and commitment to satisfaction to school stakeholders, as well as commitment from top management. A statistically significant difference existed in the perception of workers' affiliated campuses on the level of practice of TQM success factors. The study provides immediate interventions which include prioritisation of success factors and long-run interventions which include benchmarking through development of best practices and standards to be followed in all campuses in situations where significant differences were discovered. Data for the study was built upon an available sample of maintenance workers in only one university. This therefore may limit the representation of other school categories in the country in the study. The study recommends an effective communication network such as memo and newsletters to disseminate information within the maintenance department to keep employees informed and get them involved.

Keywords: Maintenance, Success factors, Total Quality Management, University buildings

INTRODUCTION

While quality has become a universal concern, tertiary institutions are challenged with maintaining existing physical facilities within acceptable quality standards (Buys & Nkado, 2006). Arguably, maintaining buildings within acceptable quality standards is one of the most important aspects of administration.

University building maintenance is an integral component of the institutions' educational programmes. School administrations have experienced a lot of setbacks in the maintenance of buildings, due to several bottlenecks. Several studies indicate that

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most schools' administrative functions, including maintenance, are complex in nature and require special skills to execute (Chaka, 2008).

The achievement of acceptable levels of quality in maintenance has long been a problem. Abu-Hassan, Khalid and Eziaku (2011) indicate that TQM has demonstrated that it's a useful tool which ensures the attainment of set standards and successful productivity improvements in the maintenance process. Although TQM has been a productive instrument for the improvement of quality in the maintenance of university building facilities, many universities are still struggling to implement TQM in the maintenance of their buildings (Yang, 2003). Owolabi et al. (2014) have identified some challenges in the implementation of TQM during building maintenance, such as; lack of proper planning and lack of an appropriate administrative culture supportive of TQM. Other barriers were further identified as: lack of customer focus, poor management commitment and involvement, lack of employee empowerment and training, drive for short-term financial outcomes, politics and turf issues, as well as availability of resources. Considerable investments in time, money and resources, both human and material, are wasted each year because of sloppy or inadequate quality management procedures during the maintenance process (Obaid, 2005).

SUCCESS FACTORS FOR THE EFFECTIVE IMPLEMENTATION OF TQM

With regard to the critical success factors for the effective implementation of TQM, no universal factors are in existence. Critical success factors have a huge impact on customer satisfaction and they vary among organisations. The effectiveness of these factors has a long-term effect on the sustainability of TQM (Idris & Zairi, 2006). Critical success factors should be linked with the goals of the organisation, since most organisations fail to practice them, despite being aware of the importance (Yusof & Aspinwall, 2000).

Fotopoulos and Psomas (2009) present the following seven critical success factors for the implementation of TQM: leadership, process management, service design, human resource management, customer focus, education and training, and supplier quality management.

Black and Porter (1996) identify ten critical TQM success factors based on the Baldrige Award criteria, and these factors are: people and customer management, supplier partnership, customer satisfaction orientation, communication of improvement information, strategic quality management, external interface management, team structure of improvement, corporate quality culture, operational quality planning and quality improvement measurement systems.

Ahire, Golhar and Waller (1996) identify twelve factors that are important for the implementation of TQM, and these factors are: top management commitment, customer focus, supplier quality management, design quality management, benchmarking, use of statistical process control, internal quality information, employee empowerment, employee involvement, employee training, product quality, and supplier performance.

Antony, Leung, Knowles and Gosh (2002) suggest the following factors should be considered when implementing or developing an efficient TQM plan: (1) Training and education of employees, (2) Employee Involvement and commitment, (3) Communication, (4) Continuous Improvement, (5) Management Commitment and

Leadership, (6) Commitment to Customer Satisfaction (7) Reduced cost of poor quality, (8) Improved competitive advantage (9) Service design.

Training and Education of Employees

Employee training and education is an important factor that assists in the achievement of quality and quality improvement during building maintenance. Mete (2004) argues that training and education of team members is a crucial factor that helps in developing quality improvement. TQM is a concept which shifts an organisation's working approach. In order to adapt to the new techniques involved, comprehensive and extensive training and education is required (Mukherjee, 2006).

Employee Involvement and Commitment

Leaders are responsible for ensuring all employees are involved and their ideas and experiences are exchanged amongst the team. Chapman (2001) emphasises that the involvement of employees can speed up understanding of organisational processes, enhance the level of decision-making and also promote knowledge and ideas among employees for the advancement of the organisation.

Communication

Kasongo and Moono (2010) indicate that the success of an organisation depends on its ability to put into place a proper communication network that facilitates proper exchange of information. There should be an effective and transparent communication network present between all levels of management. Schmint and Finnigan (1993) perceive communication during the TQM process as the factor that helps to instil confidence in others, as well as encourage team members to share risks.

Continuous Improvement

Continuous improvement requires the full support of all parties, because it promotes progress in the relationship between the customer and employee, as well as fostering innovation and organisational development (Pineda, 2013). According to Adinolfi (2003), continuous improvement of all activities in an organisation is at the heart of TQM.

Top Management Commitment and Leadership

The involvement of employees alone is not sufficient for TQM to be successful. The involvement of top management facilitates the TQM journey by ensuring that all decisions are made adequately and timeously. According to Muraid and Rajesh (2010) management should be committed to being aware of the demand for change, should renew important elements, make structural changes in the organisation, resolve conflicts, promote the participation of members and design an effective plan to improve the management process.

Commitment to Customer Satisfaction

According to Rahaman (2014) customers should be continually satisfied by conforming to their requirements in terms of product design, quality, services and prices. Hasson and Klefsjo (2003) suggest that customer satisfaction is the most important requirement for the sustainability of any organisation and that sustainable organisations understand and agree that customers will get the satisfaction they want if they receive whatever product and service they are to receive, at the appropriate time and manner that satisfies their needs. Thus, the key rationale behind TQM is valuing

the customer by paying attention to the basic customer needs and maximising customer satisfaction.

Teamwork

According to Oakland (2005) teamwork requires the exchanging of ideas and information, making decisions, solving problems and building trust amongst employees. This promotes an independent attitude towards achieving a common goal within the organisation. Rahaman (2014) explains that teamwork promotes efficiency in solving complex problems through sharing the knowledge and experiences of employees and accentuating recommendations over individual suggestions.

METHODOLOGY

A quantitative research design was adopted for the study. A total of 71 questionnaires with close-ended questions were distributed to purposively-sampled maintenance workers across 5 campuses in a tertiary institution. The maintenance team consisted of top management, supervisors, foremen, clerks of works, technicians, labourers and administrators. The questionnaire aimed to examine success factors perceived to enhance the effective implementation of TQM implementation in the maintenance university buildings. The Five-point Likert scale method was used in the questionnaire. Participants were required to score their choices from 1-5 with very low to very high for the given statements.

For the purpose of this study, reliability of scaled questions was tested with the use of Cronbach's alpha coefficient. The Cronbach's co-efficient for the scale questions was 0.94, which satisfies the reliability test requirements.

Out of 71 questionnaires administered to employees of the maintenance department, 54 questionnaires, representing a response rate of 76% were duly completed and returned. Descriptive and inferential statistics were used to analyse the data collected. For the descriptive statistics the frequency distribution and measurement of central tendency (mean and standard deviation) were used. A normality test was conducted to be able to determine the type of inferential statistics to adopt for the study. Kolmogorov-Smirnov and Shapiro-Wilk tests were adopted to test for a normal distribution or a non-normal one. The Shapiro-Wilk test and Kolmogorov-Smirnov test makes comparisons between the scores obtained from a sample to normally distributed score sets with the same mean and standard deviation. In a situation where the test is non-significant i.e. the test significance is greater than .05, it means that the difference is not significantly different from a normal distribution and it is normal. However, if the test significance is less than .05, it means the test is significantly different from a normal distribution and it is not normal (Field, 2013). The Kolmogorov-Smirnov and Shapiro-Wilk tests are commonly affected by large samples in which small variations produce notable outcomes (Pallant, 2006). For this study, the Shapiro-Wilk test was used because of the study's small sample size. Table 1 shows that the result of the normality test conducted was of level of practice of TQM success factors was 0.00, indicating a non-normal distribution. Therefore, the Kruskal-Wallis test was applied.

Table 1: Test for normality

Practice of TQM	Statistic	df	Sig.	Statistic	df	Sig.
success factors						

						Kruskal-Wallis
0.20	54	0.00	0.89	54	0.00	

FINDINGS

Research participation

Table 2: Profile of participants

Profile of participants	Bellville		Cape town		Mowbray		Wellington		Granger bay		Total	
Position	N	%	N	%	N	%	N	%	N	%	N	%
Top Management	2	3.7	0	0	0	0	1	1.9	3	5.6	6	11.2
Supervisor	3	5.6	3	5.6	1	1.9	1	1.9	1	1.9	9	16.9
Foreman	1	1.9	5	9.3	0	0	1	1.9	2	3.7	9	16.8
Clerk of Works	1	1.9	3	5.6	0	0	0	0	1	1.9	5	9.4
Technician	5	9.3	5	9.3	1	1.9	1	1.9	1	1.9	13	24.3
Labourer	3	5.6	0	0	4	7.4	1	1.9	0	0	8	14.9
Administrator	2	3.7	1	1.9	1	1.9	0	0	0	0	4	7.5
Work Experience												
0-10	4	7.5	2	3.8	0	0	2	3.8	1	1.9	9	16.2
11-20	9	16.8	12	22.0	6	11.2	3	5.7	5	9.4	35	65.1
21-30	3	5.7	3	5.7	1	1.9	0	0	2	3.7	9	17.0
31-40	1	1.9	0	0	0	0	0	0	0	0	1	1.9

Questionnaires were administered to workers across five campuses of the university; Bellville, Cape Town, Mowbray, Wellington, Mowbray and Grangerbay. Table 2 shows that 11.2% (6) of the respondents occupy the top management position, 16.9% (9) of the respondents occupy the position of supervisor, 16.9% (9) of the respondents occupy the position of foreman, 9.4% (5) of the respondents work in the position of clerk of works, 24.3% (13) of the respondents occupy the position of technician, 14.9% (8) respondents occupy the position of labourer and 7.5% (4) respondents occupy the position of administrator. 16.2% (9) respondents have less than 10 years' experience, 65.1% (35) have between 11 and 20 years' experience, 17.0% (9) have between 21 and 30 years' experience, 1.9 % (1) has between 31 and 40 years' experience.

Level of practice of TQM success factors

This section sought to investigate the level of practice of TQM success factors within the maintenance department. Respondents were required to rate their level of practice using a five-point Likert scale where; 1 = very low, 2 = low, 3 = moderate, 4 = high and 5 = very high. Responses from each campus are presented separately.

Table 3: Level of practice of TQM success factors

TQM success factors	1	2	3	4	5	Total	M	SD	Rank
	%	%	%	%	%				
Training and education of maintenance workers	0	22.2	13.0	14.8	50.0	54	3.92	1.24	1
The use of statistical methods	1.9	11.1	20.4	29.6	37.0	54	3.88	1.09	2
Commitment to the satisfaction of the school stakeholders	5.6	7.4	25.9	24.1	37.0	54	3.79	1.18	3
Commitment from top maintenance management	7.4	11.1	24.1	14.8	42.6	54	3.74	1.32	4
Benchmarking of maintenance processes	3.7	11.1	24.1	33.3	27.8	54	3.70	1.10	5
Top management involvement	3.7	5.6	35.2	31.5	24.1	54	3.66	1.02	6
Empowerment of maintenance workers	3.7	5.6	33.3	38.9	18.5	54	3.62	0.97	7
Continuous improvement of maintenance processes	3.7	7.4	37.0	37.0	14.8	54	3.51	0.96	8
Commitment and involvement of workers	11.1	7.4	14.8	61.1	5.6	54	3.42	1.09	9
Adequate communication network	9.3	3.7	31.5	53.7	1.9	54	3.35	0.95	10
OVERALL						54	3.66	1.09	

From Table 3, it is shown that the mean scores obtained were in the range between 3.92 and 3.35. The table shows that TQM success factors were diligently practiced

with respect to training and education of maintenance workers, use of statistical methods, and commitment to satisfaction of school stakeholders and commitment from top management. The remaining success factors ranged from 3.70 to 3.35, indicating that respondents expressed a moderate level of practice for the remaining success factors. The least practiced success factors were commitment and involvement of workers and adequate communication network. These findings are confirmed by Badri and Davis (1995), Owlia and Aspinwall (1997), Tang and Zairi (1998), Kanji and Malek (1999), and Bayraktar, Tatoglu and Zaim (2008).

Level of practice of TQM success factors in workers' affiliated campuses subjected to the Kruskal-Wallis test

Table 4: Test of statistics related to TQM success factors in workers' affiliated campuses

Total(N)	54
Test statistic	12.23
Degree of freedom	4
Asymp. Sig	0.01

Table 5: Post-hoc test

Sample 1- Sample 2	Test Statistic	Std. Error	Std. Test Statistic	Sig	Adj. Sig.
Mowbray vs Bellville	4.40	7.03	0.62	0.53	1.00
Mowbray vs Cape Town	5.02	7.03	0.71	0.47	1.00
Mowbray vs Wellington	-7.28	9.16	0.79	0.42	1.00
Mowbray vs Granger Bay	-25.59	8.10	3.03	0.00	0.02
Bellville vs Cape Town	-0.61	5.37	0.11	0.90	1.00
Bellville vs Wellington	-2.88	7.96	0.36	0.71	1.00
Bellville vs Granger Bay	-20.19	6.71	3.00	0.00	0.02
Cape Town vs Wellington	-2.26	7.96	2.84	0.77	1.00
Cape Town vs Granger Bay	-19.57	6.71	2.91	0.00	0.03

Wellington vs Granger Bay	-17.31	8.92	1.94	0.05	0.52
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The results from the test of statistics for the perception of workers' affiliated campuses on the level of practice of TQM success factors are presented in Table 4. The results are shown as $H(4) = 12.23$; $p = 0.01$. A significance level of 0.01 was obtained. This indicates a significant difference in the perception of workers' affiliated campuses of TQM success factors. These findings are supported by Sudhakar and Geentaji (2016). Student's perceptions regarding the practice of TQM success factors were tested within and between groups of institutions with the one-way analysis of variance. The study revealed that all the critical factors play a crucial role in the implementing of TQM with respect to different colleges. The study found that in one of the institutions, there was a significant difference regarding the perception of the practice of customer satisfaction from other institutions.

The Dunn-Bonferroni post-hoc method was used to compare the combination of different groups following a significant Kruskal-Wallis test. A pairwise comparison was conducted amongst and between the groups to determine where the significant difference lay. Results obtained from the post-hoc test are presented in Table 5. Findings reveal that a significant difference exists between respondents in Mowbray and Granger Bay ($p = 0.02$), Bellville and Granger Bay ($p = 0.02$), and between Cape Town and Granger Bay ($p = 0.03$) regarding their perception on TQM success factors. This implies that there was a variation in how TQM success factors are implemented across the different campuses and how these success factors are perceived.

Level of practice of TQM success factors in workers' positions subjected to Kruskal-Wallis test

The test of statistics for the level of practice of TQM success factors in workers' perceptions is presented in Table 6. The result indicates $H(8) = 7.88$; $p = 0.44$. Findings reveal that there is no statistical difference in the perception of TQM success factors as regards workers' positions as a result of the Asymp.sig (p-value) of 0.44 obtained. The findings from the current study are contradicted by Atieno et al. (2014). A correlation analysis was conducted for the responses of students, lecturers, administrators and top management on level of implementation of TQM success factors. The results from the study indicated that top management and administrators agreed with each other on the level at which TQM success factors were implemented, while there was a disparity in the responses of the lecturers and students.

Table 6: Test of statistics related to the level of TQM success factors in workers' positions

Total(N)	54
Test statistic	7.88
Degree of freedom	8
Asymp. Sig	0.44

CONCLUSION

It is apparent that the most significantly practiced TQM success factors were training and education of maintenance workers' use of statistical methods for monitoring and controlling of the maintenance process, and commitment to satisfaction of school stakeholders and commitment from top management. The least practiced success factors were commitment and involvement of workers and adequate communication networks. Therefore, it can be concluded that the application of success factors enhances the effective implementation of TQM in the maintenance activities of university buildings. The test carried out revealed that there was a significant difference in the perception of workers' affiliated campus on the level of practice of TQM success factors. It can therefore be concluded that there are discrepancies in the standard and processes involved in the practice of the TQM success factors across the various campuses.

The scope of the research was limited to a tertiary institution in the Western Cape province of South Africa. Challenges were encountered in getting respondents to participate in the study. Some respondents declined to complete the questionnaires administered.

RECOMMENDATIONS

A statistical difference was discovered in the perception of workers' affiliated campuses regarding TQM success factors. Given that statistically significant differences between groups were tested, it is suggested that immediate and long term interventions should be taken to address the differences in situations where variances were discovered.

In terms of immediate interventions, it is suggested that the TQM success factors should be applied rigorously during the implementation of TQM, most especially by balancing training and application of all TQM parameters across all campuses.

For long run interventions related to the campuses, benchmarking through development of best practices and standards to be followed in all campuses is suggested. Best practices for the maintenance processes should be identified. Thorough analysis of the processes leading to these best practices should be conducted and standards and improved processes should be developed. Comparisons between similar maintenance activities and performances should be conducted to improve performances, with the aim of achieving the best.

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