

Leadership and Top Management Influence on Total Quality Management Implementation in the Ghanaian Construction Industry

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How to cite this paper: Kwame, A.S., Emmanuel, T. and Ofori, A.S. (2024) Leadership and Top Management Influence on Total Quality Management Implementation in the Ghanaian Construction Industry. *Journal of Building Construction and Planning Research*, 12, 37-51.
<https://doi.org/10.4236/jbcpr.2024.122002>

Received: June 3, 2024

Accepted: June 27, 2024

Published: June 30, 2024

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Abstract

This study aims to determine the key and underlying Leadership and Top Management (LTM) factors that have a significant impact on sustaining the implementation of Total Quality Management (TQM) within the construction industry in Ghana. The research methodology employed in this study was a quantitative technique. Questionnaires were distributed to 641 participants within construction industry in Ghana. Questionnaires retrieved for the analysis were 536. Three steps approached were used for the data analysis. These include Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) analysis. After conducting the EFA and CFA, SEM was also used to analyze the construct validity. The SEM analysis helps to determine four key indicator variables for the leadership and top management construct. These include Leadership/Top Management approach to employees' management, Leadership/Top Management understanding of TQM, Leadership/Top Management empowerment of employees to resolve quality issues, and Leadership/Top Management endorsement of TQM. All the four indicator variables were found to be good of fit and closely associated with the dependent variable. The study adds to the body of knowledge by using EFA, CFA and SEM techniques to establish key leadership and top management factors affecting TQM implementation in Ghana's construction industry. The findings in general suggested that leadership and top Management factors identified have a direct positive impact on sustaining TQM implementation in the Ghanaian construction industry. Consequently, the leadership and top management factors identified in this study can help improve TQM in the Ghanaian construction industry.

Keywords

Construction Industry, Leadership, Top management,

1. Introduction

The implementation of Total Quality Management (TQM) in the industry is the effort to enhance performance in the industry [1]. [2] underscored that TQM has the potential to reduce waste and increase profitability. [3] explained that TQM consists of all activities that top management perform to improve their quality and policy such as quality planning, quality control, quality assurance and quality improvement. Its management and control processes are designed to focus on the entire organization and all of the employees in providing products or services that satisfy the customers. In this study, the concept of TQM can be defined as an integrative management principle which involves leadership and top management features for continuously improving the quality of products and processes to achieve customer satisfaction. For successful implementation of this concept in the construction industry may require leadership and top management commitment [3]. According to [4], one of the elements influencing the variance in the success rate of TQM adoption is the involvement of leadership and top management. In this study, the concept of leadership and top management can be described as the ability to lead the organisation in pursuing long-term overall business success. Most prominent authors in the field of quality, including “[5]-[13]” recognise the importance of leadership and top management commitment in an organisation [3]. A significant number of these authors discovered that the support of top management for quality was an essential component in the process of quality improvement.

The Deming Prize, European Quality Award (EQA), and Malcolm Baldrige National Quality Award (MBNQA) all recognized the critical role of leadership and top management in developing the objectives, principles, and frameworks that direct the pursuit of continuous enhancement of performance [14]. Hence, the top management of an organization bears the primary responsibility for overseeing and ensuring effective management, operation, and performance across all areas. Even though many activities may take place at lower levels of the organization, it is only the top management that has the ability to establish a crucial organizational culture that can effectively guide and encourage TQM actions among employees at lower levels [15]. [16] argue that it is impossible to implement quality management and increase performance without strong top management support. The leadership and management abilities necessary for leading large and complex organizations today need exceptional leaders who, in turn, enhance organizational performance, achieve mission success, and ensure organisational survival. As the size of an organization increases, it becomes increasingly crucial for the organization to possess a philosophy and culture that consistently guides it towards progress. As seen from the aforementioned ex-

cerpts, the literature on TQM strongly advocates for the importance of management commitment and leadership in order to achieve successful implementation of TQM [17]. Consequently, leadership and top management have a crucial role in the adoption of TQM. The goal of this research was therefore to determine leadership and top management factors that have an impact on the implementation of TQM in the Ghanaian construction industry.

2. Literature Review

Total Quality Management (TQM) is widely acknowledged as one of the most essential ways to increase the quality of an organization's output [1], but its implementation in construction industry has been a topic of debate. Different authors hold opposing views on the factors influencing its implementation in the construction industry [18]. Although TQM can be used in the construction industry, [19] opined that there exists a dearth of agreement regarding the implementation process as well as a lack of awareness of the crucial success factors (CSF's). Therefore, in order to achieve a successful implementation of TQM within the construction sector, it is very important that construction companies understand the critical factors that affect its implementation [18].

The effectiveness of TQM can be significantly influenced by the behaviour of top management and the skill sets that are being applied. According to [5], there are several distinct responsibilities that may be attributed to top management in relation to quality management. These include the establishment of quality policies, the formulation and implementation of quality objectives, the provision of necessary resources, the facilitation of problem-oriented training, and the encouragement of continuous improvement. The European Quality Award, established in 1994, and the Malcolm Baldrige Quality Award, established in 1999, both acknowledge the significant importance of leadership in establishing the objectives, values, and systems that direct the pursuit of continuous enhancement of performance. The acknowledgment of the critical role played by top management and their accountability in the pursuit of continuous quality enhancement aligns with the views espoused by renowned quality experts such as [5] [13], and [20]. According to [21], the attainment of favourable outcomes in organizational decision-making processes is closely tied to the level of support and dedication exhibited by top management. [22] assert that the presence of top management commitment is a crucial factor in guaranteeing the effective implementation of TQM. Therefore, the primary determinant of a successful TQM programme is the unwavering dedication of top-level management ([23] [24]).

It is imperative that top management take the lead in the quality management process from its inception. This is demonstrated by the active involvement of top management, top management encouragement, the delegation of authority to employees, the acquisition of knowledge by top management, the dedication of top management to staff education and training, and the relentless pursuit of

product quality and long-term business success by top management. A recurring subject in quality management literature is the importance of strong commitment from top management. Indicating such commitment is thus a key leadership principle for achieving TQM. [25] asserted that a deficiency in top management commitment is a contributing factor to the failure of TQM initiatives. Nevertheless, just commitment from top-level management is not enough. It is extremely crucial that top management participates in various quality management operations personally. It should also actively promote employee participation in quality management operations. [26] emphasised that encouraging people to assess the level of quality is an important leadership and top management activity.

Effective leadership from top management is crucial in providing essential resources, implementing a clearly defined quality policy throughout the organization, developing a robust quality management system, and closely monitoring and evaluating the entire process. An organization's culture and climate must foster open cooperation and teamwork among stakeholders in quality management [27]. [28], states that the initial implementation of TQM involves the creation of fresh organizational policies, procedures, and tools that necessitate learning. According to [28], TQM is a process of organizational transformation that is frequently linked to instability, misunderstanding, and resistance from employees. It is crucial to commence this process with regular engagement from management. This aligns with the findings of [29] which suggest that it is imperative for top-level management to establish a well-defined quality mission and goals, as well as identify and effectively convey quality values to all staff members. In order to ensure successful implementation, it is imperative that they establish a comprehensive quality planning process and a robust quality management framework. In a study conducted by [29], the critical factors of TQM in Palestinian organizations were empirically examined. The findings revealed that top management commitment and involvement, as demonstrated through the development of a clear organizational mission, quality policy and values, realistic quality goals, proper planning for quality management, and the establishment of a quality management structure, ultimately foster quality awareness and enhance the implementation of quality management systems. Top management's commitment is typically the first requirement for implementing and adopting TQM to improve an organization's performance [30]. In addition, the adoption of a quality management concept facilitates the implementation of quality programmes [31]. If the top management declines to engage and endorse the new philosophy, it is quite probable that it will not succeed. In order for TQM to thrive, it is imperative that top management provides both financial and moral backing to it [32].

3. Methodology

The research was conducted by using a structured questionnaire survey. Ques-

tionnaires designed for research purposes must possess the qualities of being easy to answer, unbiased, succinct, and clear in order to facilitate analysis ([33] [34]). In order to obtain more accurate data and assist in assessing the participant's impression of leadership and top management features for implementing TQM, a survey question was adopted. The questionnaire was personally delivered to the participants.

The study population consisted of all construction firms in Ghana ranging from small to large size (D4K4 to D1K1). The participants were instructed to evaluate each item using a Five Point Likert scale, indicating their level of agreement or disagreement with leadership and top management features for implementing TQM in the construction sector. The sample frame was developed by acquiring a roster of registered construction firms in good standing from the Association of Building and Civil Engineering Contractors of Ghana (ABCECG). Good standing construction companies which have registered with the ABCECG as at the time of collecting the data for the research was one thousand two hundred and eighty-two (1282). The study opted to select a sample size that represents 50% of the total population of the study. According to [35], if the population size is approximately 1500, it is recommended to sample at least 20% of the population. Hence, considering the total population of 1282 for the study, a 50% sample size (641) was considered sufficient for the purpose of the study. The study employed the probability sampling strategy, which ensured that all parts of the construction businesses, as previously established, were included in the sample. This approach guaranteed the selection of an accurate representation of companies for the study. Hence, a simple random sampling procedure was employed, ensuring that every individual in the population had an equal probability of being chosen [36]. The decision to choose this sampling approach was determined by the characteristics and composition of the construction firms in Ghana. The choice of an appropriate sample for the study was determined by Smith [37] recommendation that random sampling is essential for a study of this kind.

Out of 641 questionnaires administered to top management in the Ghanaian construction sector, 536 were fully completed and returned for analysis, reflecting an 83.62% response rate. The data collected was coded and analyzed through Statistical Package for Social Sciences (SPSS) version 20 to assess the Kaiser-Meyer-Olkin and Bartlett's test. In addition, data suitability test was conducted to ensure acceptable internal reliability of variables, employing the Cronbach's alpha [38] [39]. The analysis consisted of three parts: Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modeling (SEM) employing EQS software Version 6.2. The Exploratory Factor Analysis (EFA) was conducted to obtain information on the unidimensionality of the factors in order to determine their factor-analysability. The analysis approach chosen for this study is the Maximum Likelihood with a minimum eigenvalue of one, along with Principal Axis Factoring with Oblimin Kaiser Normalization. Factor analysis is deemed appropriate when the Kaiser-Meyer-Olkin (KMO) is

higher than the satisfactory minimum limit of 0.5 and a desirable limit as 0.8 or greater [40]. [41] recommended that a cut-off value of KMO should be higher than or equal to 0.7. [41] further stated that Bartlett's test with a significance level of less than 0.0001, confirms the suitability of the factor. The output from the analysis was presented as Means, Standard Deviations, Factor Loading, Corrected Item-Total Correlation and Cronbach's Alpha which helped to establish and assess leadership and top management features for TQM implementation in the construction sector.

4. Results

Table 1 presents the Leadership and Top Management (LTM) factors/attributes, expressed as a percentage of responses on a scale of 1 (Not at all influential) to 5 (Extremely influential), together with the corresponding Means (MS) values ranging from 1.00 to 5.00. All of the Mean scores (MSs) are higher than the midpoint score of 3.00. This suggests that the respondents agreed with the variables stated in the LTM as influential in the adoption of Total Quality Management (TQM) in the construction industry.

Exploratory Factor Analysis (EFA) was also performed to evaluate the consistency and reliability of the impact of the LTM variables on TQM adoption within the construction sector. The extraction and rotation approach chosen

Table 1. Influential top management factors/attributes.

Factors/Attributes	Not at all influential.....Extremely influential					MS	SD	Rank
	1	2	3	4	5			
Leadership/Top Management involvement in TQM activities	0.00	2.23	15.87	37.70	44.20	4.25	0.81	1
Leadership/Top Management endorsement of TQM	0.00	4.86	19.95	27.44	47.75	4.19	0.93	2
Leadership/Top Management dedication to TQM	1.13	3.35	21.26	27.04	47.22	4.17	0.96	3
Leadership/Top Management skill in resolving quality-related issues	1.32	1.67	19.21	36.37	41.43	4.16	0.89	4
Leadership/Top Management understanding of TQM	1.13	4.65	19.41	32.64	42.17	4.11	0.96	5
Leadership/Top Management approach to employees' management	0.00	4.28	18.86	39.54	37.32	4.11	0.86	5
Leadership/Top Management engagement with employees	0.18	2.25	20.32	42.17	35.08	4.11	0.82	5
Leadership/Top Management efforts to improve TQM	0.00	3.53	23.15	35.83	37.49	4.08	0.87	8
Leadership/Top Management empowerment of employees to resolve quality issues	0.00	3.55	25.38	36.36	34.71	4.03	0.87	9

for this study was Principal Axis Factoring with Oblimin rotation (PAF Oblimin). The EFA results are shown in **Tables 2-4**. **Table 2** presents the factor loading, corrected item-total correlation and cronbach's alpha results. **Table 3** also presents the results of the Sampling Adequacy Test (KMO and Bartlett's Test). While **Table 4** presents the reliability of factors measuring leadership/top management construct.

Following the establishment of reliability by exploratory factor analysis (EFA), a confirmatory factor analysis (CFA) was conducted to assess the measurement equivalence of the latent construct. The CFA establishes a connection between the scores obtained from a measuring instrument and the underlying construct that the instrument is intended to assess. The CFA results defined the relations between the observed and unobserved variables. In other words, the purpose of the CFA was to confirm the factor structure of both the observable and unobserved variables, hence, establishing the construct validity as shown in **Table 5**.

Table 2. Factor loading, corrected item-total correlation and Cronbach's Alpha results.

Factors/Attributes	Factor Loading	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Leadership/Top Management approach to employees' management	0.859	0.824	0.918
Leadership/Top Management skill in resolving quality-related issues	0.756	0.727	0.924
Leadership/Top Management efforts to improve TQM	0.753	0.726	0.924
Leadership/Top Management understanding of TQM	0.832	0.798	0.920
Leadership/Top Management dedication to TQM	0.781	0.751	0.923
Leadership/Top Management engagement with employees	0.706	0.677	0.927
Leadership/Top Management involvement in TQM activities	0.708	0.683	0.927
Leadership/Top Management empowerment of employees to resolve quality issues	0.787	0.756	0.922
Leadership/Top Management endorsement of TQM	0.780	0.749	0.923

Table 3. Sampling adequacy test (KMO and Bartlett's test).

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.919
Bartlett's Test of Sphericity	Approx. Chi-Square	3289.158
	Df	36
	Sig.	0.000

Table 4. Reliability of factors measuring Leadership/Top Management construct.

Construct	Number of Items	Cronbach's alpha value	Cronbach's alpha Based on Standardized Items
Leadership/Top Management (LTM)	9	0.930	0.930

Table 5. Reliability and construct validity.

Factor	Indicator Variable	Factor Loading	Cronbach's Alpha	Rho Coefficient
Leadership and Top Management (LTM)	LTM1	0.847	0.895	0.801
	LTM4	0.847		
	LTM8	0.826		
	LTM9	0.783		

The construct validity of the measurement model was further examined using EQS version 6.2 with the maximum likelihood robust estimator. The SEM analysis of the study established four indicator variables for LTM. These indicator variables are Leadership/Top Management approach to employees' management (LTM1), Leadership/Top Management understanding of TQM (LTM4), Leadership/Top Management empowerment of employees to resolve quality issues (LTM8), and Leadership/Top Management endorsement of TQM (LTM9) as shown in **Table 5**.

A measurement Model for LTM Construct is presented in **Figure 1**. Using CFA for analyzing this construct, four (4) observed/indicator variables and unobserved variables made up of the same factor were realized and the name LTM was maintained. The four (4) observed/indicator variables were labeled LTM1, LTM4, LTM8, and LTM9, while the four (4) unobserved variables were labeled EE1, EE4, EE8, and EE9. The four-indicator model provides good measures of residual matrix and evidence of convergent validity.

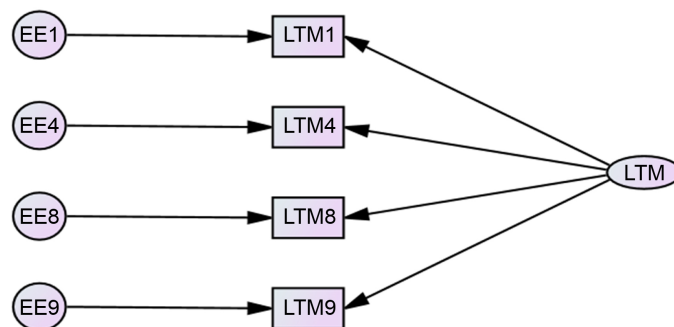


Figure 1. Measurement model of Leadership and Top Management (LTM).

4.1. Analysis of Residual Covariance Estimate

To assess the adequacy of the model in representing the sample data and the extent of the relationship between the variables, various analyses were conducted. These included examining the residual covariance matrix (both unstandardized and standardised), analysing the distribution of standardised residuals, evaluating fit statistics, and determining statistical significance at a 5% probability level. The unstandardized and standardised absolute residual matrix values for the LTM construct are shown in **Table 6** and **Table 7**. The findings indicated that

both the absolute residual values and the average off-diagonal absolute residual values were in close proximity to 0.000. The unstandardized average off-diagonal residual was determined to be 0.000, whereas the standardised average off-diagonal residual was also measured to be 0.001. A residual value that exceeds 2.58 is considered to be substantial, according to [42]. Because the absolute residuals for the LTM construct (measurement model) were all less than 2.58, the results revealed a reasonably satisfactory fit to the sample data. In order for a model to be considered well-fitting, it is necessary for the covariance matrix of the residuals to exhibit symmetry and be centred on zero [42] [43]. The results indicated a measurement model that was highly satisfactory. Thus, as the diagnostic fit study demonstrated a good fit, additional test of goodness-of-fit may be conducted to reach a definitive conclusion regarding the fit and suitability of the measurement model.

Table 6. Unstandardized residual covariance matrix.

	LTM4	LTM9	LTM8	LTM1
LTM4	0.000			
LTM9	-0.019	0.000		
LTM8	0.008	0.008	0.000	
LTM1	0.005	0.001	-0.013	0.000
Average off-diagonal absolute residual = 0.000				

Table 7. Standardized residual covariance matrix.

	LTM4	LTM9	LTM8	LTM1
LTM4	0.000			
LTM9	0.053	0.000		
LTM8	0.007	0.021	0.000	
LTM1	-0.019	-0.021	-0.007	0.000
Average off-diagonal absolute residual = 0.001				

4.2. Goodness-of-Fit Statistics—Robust Maximum Likelihood (RML)

The study used a blend of goodness-of-fit statistics to evaluate the fit of model as recommended by [44]. **Table 8** shows the goodness-of-fit indices and the accepted cut-off values that were chosen for this study. The analysis of the Leadership and Top Management measurement model produced an $S - B\chi^2$ value of 6.827, with 2 degrees of freedom (df), and a probability (p) of 0.033. It was discovered that the degrees of freedom and chi-square were 3.414. This ratio fell within the recommended range of 3.00 to 5.0 as proposed by [45]. The chi-square value suggests that there is a significant departure of the sample data from the postulated measurement model, indicating a strong fit. The NFI value

Table 8. Robust fit indexes for leadership and top management features model.

Fit Index	Cut-off value	Estimate	Comment
$S - B\chi^2$		6.827	
Df	$0 \geq$	2	Good fit
Normed chi-square = χ^2/df ratio	≤ 2 or 3 good fit ≤ 5 acceptable	3.414	Good fit
CFI	0.90 \geq acceptable 0.95 \geq good fit	0.996	Good fit
RMSEA	Less than 0.05 with confidence interval	0.067	Acceptable Fit
95%	(CI) 0.00 - 0.05 "good fit"		
NFI	Greater than 0.90 "good fit"	0.995	Good fit
NNFI	Greater than 0.80. "good fit"	0.988	Good fit
SRMR	Equal or less than 0.05 "good fit"	0.009	Good fit
	Equal or less than 0.08 "acceptable fit"	0.08	Acceptable fit

achieved was 0.995, which is greater than the recommended cut-off value of NFI 0.95 by [44]. The NNFI value achieved was 0.988, exceeding the threshold of 0.80. The CFI value was discovered to be 0.996, which was greater than the cut-off standard of 0.95, indicating that the model has a good fit. The fit indices for the LTM model indicate that the postulated model accurately represents the data from the sample. Hence, the model is acceptable.

5. Discussion

It is worth noting that all of the Leadership and Top Management (LTM) factors have an $MS > 4.00$, indicating that respondents consider the LTM factors to be "influential" to "very influential." The comparatively high MS, ranging from 4.02 to 4.24, indicates that these factors are quite important in promoting TQM implementation in construction sector. Among the nine influential factors identified in the study, Leadership/Top Management involvement in TQM activities was ranked first, followed by, Leadership/Top Management endorsement of TQM, Leadership/Top Management dedication to TQM, Leadership/Top Management skill in resolving quality-related issues, Leadership/Top Management understanding of TQM, Leadership/Top Management approach to employees' management, Leadership/Top Management engagement with employees, Leadership/Top Management efforts to improve TQM, and Leadership/Top Management empowerment of employees to resolve quality issues was ranked last as shown in **Table 1**. This study supports the claim made by [23] [24] that the primary determinant of a successful TQM programme is the unwavering dedication of top-level management. The study also aligns with the findings of [30] who posited that the dedication of top-level management is usually a prerequisite requirement for the successful implementation and adoption of TQM in or-

der to improve organizational performance. [17] concluded that TQM literature widely supports the necessity of leadership and management dedication for successful TQM implementation.

The factor loadings for all items were found to be more than 0.705, as shown in **Table 2**. The factor loadings were also determined to exceed the recommended threshold of 0.40, as proposed by ([46] [47]). Hence, all the nine LTM factors (measurement variables) identified were found suitable and good measures of LTM construct for effective implementation of TQM in the construction industry. The corrected item-total correlation was more than the specified cut-off value of 0.30, indicating that the items were suitable for measuring the LTM construct for the implementation of TQM in the construction sector. The result is as reported in **Table 2**. The Kaiser-Meyer-Olkin (KMO) value of 0.919, along with Bartlett's test of sphericity with a significance level of 0.000 was achieved (**Table 3**), indicating a high level of consistency. This is in line with the recommended KMO cutoff value of 0.70 and the significance level of $p < 0.05$ for Bartlett's test of sphericity, as proposed by [41]. The obtained Cronbach's alpha was 0.930, which is greater than 0.700, indicating a satisfactory level of internal reliability [48]. This information is presented in **Table 4**.

The key and underlying leadership and top management factors determined after the SEM analysis are: Leadership/Top Management approach to employees' management, Leadership/Top Management understanding of TQM, Leadership/Top Management empowerment of employees to resolve quality issues, and Leadership/Top Management endorsement of TQM. The SEM analysis indicated a strong correlation between the four variable indicators and the dependent variable. This is evident from the statistically significant standardised factor loadings and interfactor correlations with other indicator variables (**Table 5**). Furthermore, the analysis of variances attributed to each measure by the endogenous variable indicated that the scores were statistically significant. Moreover, the values were greater than the minimum threshold of 25 percent, to be attributed as an influence on TQM. The findings in general suggested that leadership and top Management factors determined have a direct positive impact on the implementation of TQM in the Ghanaian construction industry. This study affirms the assertion made by [3] that the involvement of top management and their leadership skills are among the elements that influence the degree of success in implementing TQM. The study also supports the view put forth by [16] that it is unfeasible to implement TQM and enhance performance without robust support from top management. [15] asserted that though many activities take place at lower levels of the organization, it is only the leadership or top management that has the ability to establish the required organizational culture to effectively guide and encourage TQM actions among employees at lower levels. The study therefore acknowledges that the leadership and top management of an organization bears the responsibility for implementing TQM. Without the participation and support of leadership and top management, the TQM concept

will probably fail. Therefore, in order for TQM to succeed, leadership and top management must financially and responsibly embrace the concept.

6. Conclusion

It should be noted that for a successful application of Total Quality Management in the construction industry, it is imperative that construction firms comprehend the factors that affect its implementation. This study established four key and underlying leadership and top management factors that influence the Total Quality Management implementation in the construction industry. These include Leadership/Top Management approach to employees' management, Leadership/Top Management understanding of TQM, Leadership/Top Management empowerment of employees to resolve quality issues, and Leadership/Top Management endorsement of TQM. All the four leadership and top management factors established were found to be significant and have strong influence on TQM implementation in the construction industry. The study also revealed that in order for TQM to be successful, it is imperative that top management provides both financial and moral support for its implementation. Without such support, TQM is unlikely to be sustainable. Hence, when much attention is given to these established factors, the much-desired TQM in the construction industry will be achieved. The study is anticipated to fill the gap in the literature regarding the critical factors influencing TQM implementation in the construction industry.

Acknowledgements

The authors wish to express their profound gratefulness to the Almighty God who made this research a successful one and to all the registered construction firms and professionals in the study area, for finding time to respond to the questionnaires in spite of their busy schedules.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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