

Effects of Total Quality Management on Performance of Construction Industry in Tanzania: A Case of Construction Companies in Mwanza

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Abstract:- Quality as the most important consideration in modern construction, as clients choose prospective contractors based more and more on a company's reputation for producing high-quality work. Several studies have demonstrated the relationship between. The objective of the research was to examine effects of total quality management on performance of construction industry. A descriptive survey research design was used. The targeted population was estimated to be 340 workers companies as the unit of analysis and questionnaires were distributed to the respondents in the construction companies, and a total of 98 response rate was recorded which was equivalent to a 54-response rate where from population a sample size was estimated based on probability sampling. The study received responses from the sample size is 181 and hence 181 questionnaires were distributed to the workers of construction companies. Data were evaluated with the aid of SPSS version 22 into descriptive statistics mainly mean value scores and also regression analysis. Descriptive statistics includes analyzing data in the form of mean, median, mode and standard deviation and the internal consistency of the measured scale was observed by using Cronbach Alpha. Researchers have proposed the ranges to be used for computing acceptable benchmarks of Cronbach Alpha. Meanwhile, regression was used as a statistical technique. The conclusions of the project's top staff's ability to lead appropriately and effectively and their acceptance of quality responsibility where the study shows that 48.0% agreed with the statement. These findings indicate that the project's senior staff takes accountability for quality work and offers suitable and effective leadership. Based on the results, it can be said that strong leadership improves construction projects' success in construction company. The study suggests that policies pertaining to construction projects should include leadership.

Keywords:- TQM, Employees.

I. INTRODUCTION

TQM emphasizes continual improvement within the company in order to give customers better value. It comes from a system science point of view. The quality theory and methods foundation of the TQM principles proposed by

(Mohammed, Saeed, and Hasan 2012). The TQM paradigm has been applied successfully in construction enterprises, according to a number of empirical investigations. For the total quality management (TQM) has been implemented, and some academics have looked at how well it affects business performance (Egwunatum et al. 2022). The customer satisfaction, employee involvement, and process improvement are the three guiding concepts of TQM. The necessity to evaluate the impact of TQM on construction project performance and use TQM practices to enhance construction project performance in Tanzania, as has been suggested in the different literature and research. The TQM paradigm has been applied successfully in construction enterprises, according to a number of empirical investigations, the total quality management (TQM) deployment and its benefits for construction industry performance (Deepika, Anandakumar, and Krishnamoorthy, 2020.)

(Egwunatum et al. 2022) The most important component in determining the success of a TQM implementation is the company's capacity to translate, integrate, and institutionalize TQM principles on the job. TQM is an approach to ensuring that tasks are completed accurately the first time around that takes into account goals, teams, processes, and individuals. (Omar, Kashou, and Samantha 2015). A project, according to the PMI, is an undertaking that is temporary and has a set start and end date. A project is additionally distinctive when it includes a particular set of procedures that are not ordinary but rather are intended to achieve a particular objective.

II. LITERATURE REVIEW AND HYPOTHESES

➤ Theoretical Framework

This study was guided by Resource-Based View Theory which was proposed by Barney, 1991; Wernerfelt, (1981). The resource-based view (RBV) is a method for identifying, creating, and exploiting the unique combinations of resources, abilities, and competencies of all the organization's tangible and intangible assets. According to this approach, organizational talents and competences, intangible assets, and tangible assets are the three main types of resources. All of these companies' resources are employed to carry out their regular business operations. Even if certain intangible assets cannot be seen or felt, they

are nonetheless important. A business uses these resources to gain a competitive edge (Agus and Hassan 2011a)

Intangible assets, particularly product reputation, are the primary drivers of product innovation performance, supporting the RBV point of view. Customers' perceptions of a company's reputation can sometimes influence whether special features of a product stay distinctive if they are difficult for competitors to copy or reverse-engineer (Lau, Zhao, and Xiao 2004). Intangible assets, particularly product reputation, are the primary contributing indicators to product inventive performance, which is in accordance with the Resource Based View idea (Lau, Zhao, and Xiao 2004). By examining shifts in the capacities to manage the quick changes in organizational contexts, recent RBT research has been improved by dynamic capabilities (internal and external). The emergence of dynamic capabilities has broadened the definition of capabilities to encompass both controllable resources for value production and resource change (Srima, Wannapiroon, and Nilsook 2015).

➤ *Empirical Literature Review*

Study by (Agus and Hassan 2011b) introduction to comprehensive quality management for production, processing, and services demonstrates that companies have concluded that effective implementation of TQM may increase their competitiveness in the market and provide them with strategic advantages. Furthermore, as per the findings of other researches on the critical success aspects of Total Quality Management (TQM) and its influence on improved service quality (Pius Dickson Gumo, Nambuswa Makokha, and Namusonge 2018): According to a case study from Pakistan's service industry, only 20–30% of the companies who implemented TQM have shown improvements in quality, efficiency, and competitiveness.

Study by (Srima, Wannapiroon, and Nilsook 2015) on the effect of corporate culture and total quality management on construction project performance in Taiwan, the introduction of TQM results in a 90% improvement rate in staff relations, operating procedures, customer satisfaction, and financial performance. Total quality management (TQM) deployment and its benefits for business performance have been studied by certain researchers. (Ye and Tekka 2020) In order to implement Total Quality Management (TQM) in construction firms, a study proposed the following fundamental framework: customer feedback system; continuous improvement; teamwork promotion; supplier reduction; process management and improvement through productivity study; effective communication system; top management; organizational culture review; training plan production; and monitoring process establishment.

The study by Mane, (2015) on quality management system at construction project highlighted the many stages in which construction industry experts apply TQM and its tools to their projects (design and construction). It is now evident from the findings and conclusions of each case study in this paper that TQM is not a fad and how many advantages TQM may provide to your construction business

(Improve business quality, increase customer satisfaction, reduce cost, save time and much more). (Barros, Sampaio, and Saraiva 2014) Construction professionals' lack of familiarity with TQM's principles and practices is the primary cause of the construction industry's tardy adoption of TQM. To bring these benefits to the construction industry, more efforts must be made to spread the culture of TQM among the construction professionals and TQM courses must be in the engineering under graduated programs.

The study by (Lau, Zhao, and Xiao 2004) on Assessing quality management in China with MBNQA criteria shows that, despite a greater than average percentage of them claiming to be total quality management organizations, the study results show that the majority of Chinese enterprises still do not fully comprehend strategic quality management. Quality managers and experts should take the lead in promoting modern, strategic quality management concepts and practices in order to advance the quality movement in China. The analysis of each criterion's results reveals that, among the three groups of firms, the TQM firms embraced the MBNQA's preferred quality management techniques to the greatest extent. (Egwunatum et al. 2022) In comparison to the INS firms, the SQC firms' quality processes were also more in line with the MBNQA standards. The findings imply that Chinese businesses' quality procedures are becoming more in line with the MBNQA standards as they transition from a focus on inspection to statistical quality control and finally to overall quality management.

Irfan and Kee (2013) argued that total quality control is a management approach can be utilized by the construction industry and its benefits will increase the performance of construction companies, recommend that this approach is a clear quality management approach which can be followed by the industry practitioners. The above study shows that TQM as a management approach can be used to get these three performance variables and specifically in the construction industry, so this system seems to have positive impacts on the performance of the construction industry. (Mwololo and Were 2021) Performance of the construction industry is measured through timely delivery of works, Quality of works, and Value of money obtained from the investment. Although the aforementioned Malaysian study concluded that TQM should be implemented in the construction sector, this study opens the door to further investigation of TQM's effects on Tanzania's construction sector performance because earlier research had shown that TQM has positive effects on the sector's performance.

➤ *Conceptual Framework*

This conceptual framework was developed following a careful examination of earlier studies that had been conducted by various academics. A conceptual model was established to help grasp the relationship between the two variables, participation of employees, training of employees, and team work, and it was based on the correlation between the independent and dependent variables. Through total quality management performance, participation of employees, training of employee and team work as the

primarily aim for effective of Total Quality Management on Performance of Construction Industry and continual expansion. An organization's performance mostly depends on its workforce, and stressed the importance of employees' roles in construction. As a result, it's important to adopt

effective employee incentive strategies that will help the firm achieve its goals. Furthermore, an efficient approach of motivation may be described as a way to impact and improve employees' commitment to an organization's performance.

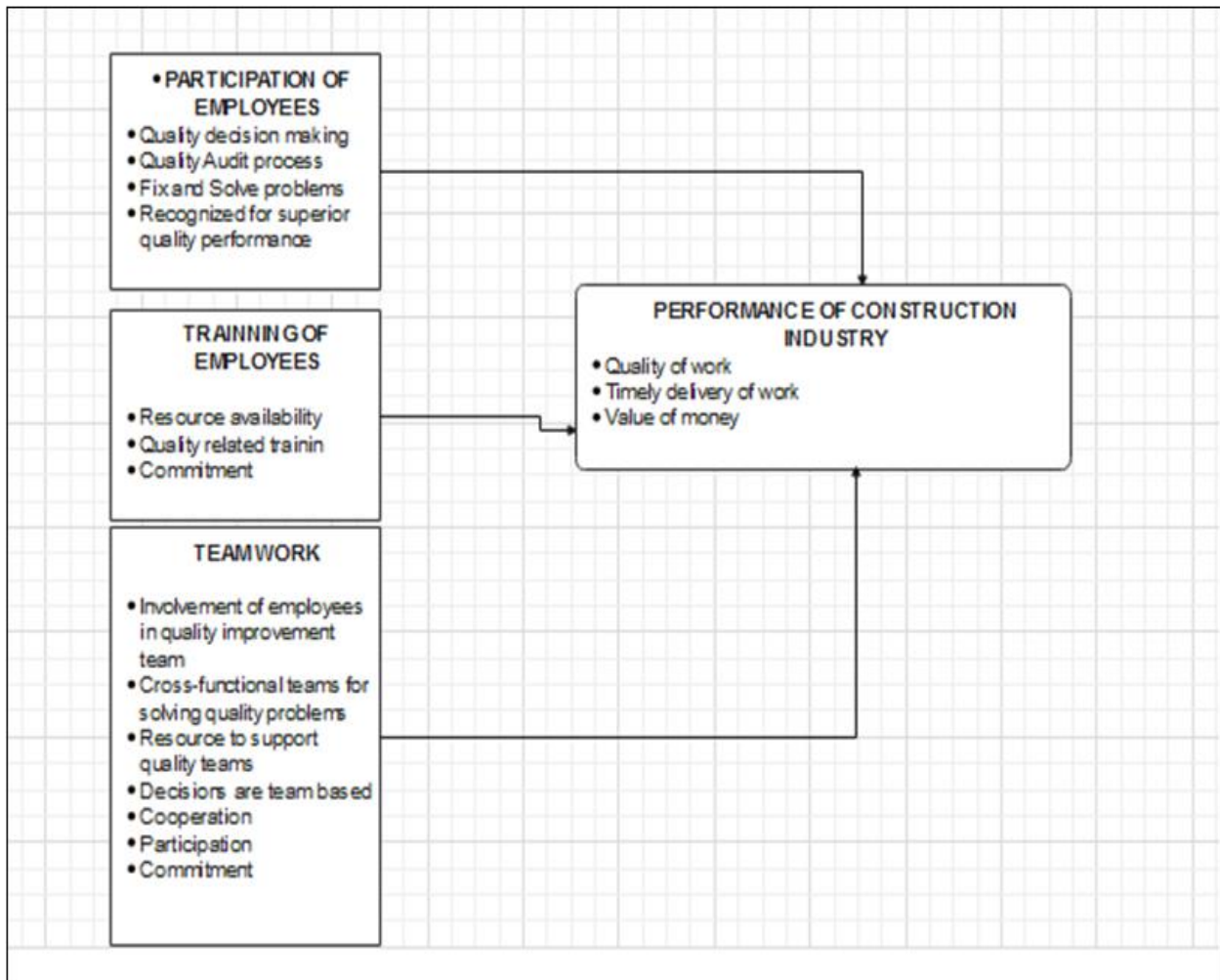


Fig 1 Conceptual Framework
Source: Researcher (2022)

III. RESEARCH METHODS

The study was designed as quantitative research, by targeting a large sample of respondents from the Construction industry workers in Mwanza region, Tanzania. The study used quantitative study technique to find the relationship between components of TQM and performance of construction industry. The use of a quantitative approach permits the scholar to collect a large sample of respondents and the results obtained has reflected the opinions of the majority (Panuwatwanich and Nguyen 2017) and validate the research conceptual framework. This study was piloted in the United Republic of Tanzania, Mwanza city covering the construction Industry firms located within the region, the targeted audiences in this study were construction industries stakeholders covering. This study was done in Mwanza region because Mwanza is the big city and construction activities are done in large scale compared to other regions located in Lake zone

This study considered the 34 companies as the unit of analysis and targeted the workers who were Engineers, Quantity Surveyors, Architects, Technicians, Quality Managers and Work Supervisors in the construction companies in Mwanza region. It was estimated that each company had approximately ten workers. The sample size was dogged from the population of about 340 workers of construction companies located in the Mwanza region. The sample size is 181and hence 181 questionnaires were distributed to the workers of construction companies.

The study's variables were included in the questionnaires, and respondents were asked to score each variable's strength on a 5-point Likert scale, where 1 meant "Strongly Agree," 2 meant "Agree," 3 meant "Neutral," 4 meant "Disagree," and 5 meant "Strongly Disagree." A pilot test was performed to assess the validity and reliability of the study instrument. To ascertain how independent variables affected the dependent variable, multiple regression analysis was utilized. The regression enhanced

the findings further by showing the most significant factors measured by standardized beta values and p-value which shows the variables that are significant and those that are not significant.

IV. FINDINGS AND DISCUSSION

The study sought to establish the effects of total quality management on performance of construction industry: a case of construction companies. The findings on the participation of employees on the performance of the construction industry. The findings showed that employee

participation which was measured by five (5) items. All five (5) items received higher score values with an overall mean score of 4.1. Item 1 (PE1) which is “Workers involvement in Quality decision making increases the efficiency of the construction industry” scored 3.5 high mean value and item 2 namely “Workers involvement in Quality Audit process increases the efficiency and performance of construction industry” scored a high mean value of 3.9. Meanwhile, item 3 (PE3) which is “Workers involvement in solving and fixing Quality problems occurred during construction activities results to quality and timely delivered work” scored a high mean value of 4.1.

Table 1 Mean for Participation of Employees Component (n=98)

Section A: Participation of Employees (PE)		
	Mean	Value
PE1- Workers' involvement in Quality decision-making increases the efficiency of the construction industry	3.5	High
PE2-Workers involvement in the Quality Audit process increases the efficiency and performance of the construction industry	3.9	High
PE3-Workers involvement in solving and fixing Quality problems occurred during construction activities results in quality and timely delivered work.	4.1	High
PE4-Technical assistance provided to workers in solving Quality Problems in construction projects results in quality and timely delivered works	4.2	High
PE5- Workers' rewards for superior Quality performance increase the Quality of work and result to value for money to clients	4.0	High
Overall Mean Value of Employee Participation	4.1	High

➤ *Mean Score for Training of Employees*

Findings on the Table 2 below showed the mean score findings for the variable “Training which was measured by six (6) items as was composed on the questionnaire. All six (6) items had revealed to produce high with an overall mean value of 3.8 as shown below. Item 1 (TE1) which stated “Training increases the efficiency of construction activities” scored a 4.1 high mean value and item 2 (TE2) which stated “The training provided adds value to the quality of work conducted” scored a high mean value of 4.0.

Furthermore, item 3 named (TE3) which is “Training provided will enable construction project to be delivered in time” also scored a high mean value of (4.3). Item 4 (TE4) which was “Training provided will enable the schedule of construction activities to be adhered to according to work programs and schedule of work” scored a high mean value

of 3.8. Meanwhile, Item 5 (TE5) which stated “Training provided enabled to obtain the value of money to the clients performing construction projects” scored a high mean value (4.2) and lastly, item 6 (TE6) which was “Training in “Total Quality and Continues improvement” will increase the efficiency of construction project implementation and results to quality and timely delivery project” also scored high mean value of 4.1.

The overall mean value of 3.9 for the factor of Training under quality factors of the construction industry suggests that the respondents strongly agreed that training is an important criterion under TQM in the construction industry just like in many other sectors. Hence, management of construction companies whether public or private are urged to take their staff for training as new designs and fashions and corrections in the sector are important.

Table 2 Mean for Training Component (n=98)

Section B: Training of Employees (TE) Component		
	Mean	Value
TE1: Training increases efficiency of construction activities	4.1	High
TE2: The training provided adds value to the quality of work conducted	4.0	High
TE3: Training provided will enable the construction project to be delivered on time	4.3	High
TE4: Training provided will enable the schedule of construction activities to be adhered to according to work programs and schedule of work.	3.8	High
TE 5: Training provided enabled to obtain the value of money to the clients performing construction projects	4.2	High
T E6: Training in “Total Quality and Continues improvement” will increase the efficiency of construction project implementation and results in quality and timely delivery of project	3.8	High
Overall Mean Value for Training Component	3.9	High

➤ *Mean Score for Teamwork*

The mean findings for teamwork among employees; and how it affects quality management in the construction industry. The variable had six (6) items. The overall mean

value for this component was high (3.8). Four (4) items of the study scored high mean values ranging from 3.8 – 4.0. Meanwhile, two (2) items scored moderate mean values ranging from 2.5 – 3.4 as depicted in the table above. The

first item in the component (TW1) “The organization does involve employees in making Quality improvement teams will result to quality implemented projects. (cooperation)” scored a mean value of 2.8 while the second item (TW2) which stated “The organization quality teams imparts knowledge and skills of solving problems to other employees (participation) will result to quality and timely delivered of construction projects” scored mean value of 3.4. The two are categorized as medium scores.

Meanwhile, the mean value for item 3 (TW3) “The organization provides support of resources to Quality controls and assurance teams will results in Quality and

timely delivered construction project (commitment) had a mean score of 4.0. Item 4 (TW4) which was “If the decision about Quality of work is determined by all members of Quality teams will result in quality and timely delivered of construction projects. (Team Work)” scored a mean value of 3.8. With regards to item 5 (TW5) which stated “Quality teams enable the construction project to be completed in time to meet deadlines and schedule of works” had a mean value of 3.9 and finally the last item (TW6) which was “Quality teams enable the construction project to have the value of money and meet the customer requirements” had a mean score of 4.0.

Table 3 Mean for Team Work (n=98)

Section C: Team Work Component (TW)		Mean	Value
TW1: The organization does involve employees in making Quality improvement teams will result in quality implemented projects. (cooperation)		2.8	Moderate
TW 2: The organization quality teams impart knowledge and skills for solving problems to other employees (participation) will result in quality and timely delivery of construction projects		3.4	Moderate
TW 3: The organization provides support of resources to Quality controls and assurance teams will result in Quality and timely delivered construction projects (commitment)		4.0	High
TW 4: If the decision about the Quality of work is determined by all members of Quality teams will result in the quality and timely delivery of construction projects. (Team Work)		3.8	High
TW 5: Quality teams enable the construction project to be completed in time to meet deadlines and schedule of work.		3.9	High
TW6: Quality teams enable the construction project to have value for money and meet the customer's requirements.		4.0	High
Overall Mean Value for Team Work of Employees		3.8	High

➤ *Regression Analysis*

This study sought to run a regression analysis to preview and confirm the descriptive statistics results of the mean values reported above. Regression results will show if there is a statistically significant variable hence easier to conclude. Since the mean score of all the variables were

showing higher loading, and also the reliability test (Cronbach Alpha) showed higher reliability, it was an indication that the measurements were consistent. Therefore, the following regression results were performed and the results recorded.

Table 4 Regression Model Summary

Model	R	R Square	Adjusted R Square	Std. The error in the Estimate	F	Sign
1	.754 ^a	.568	.559	1.92437	60.602	0.001

a. Predictors: (Constant), PE, TE, TW

Key: PE=Participation of Employees, TE=Training of Employees & TW=Team work

The results in Table 10 above shows the initial Regression value (R) value of 75.4% which confirms the relevance of independent values in the regression equation. It also shows that R-Square of 56.8% which is adjusted to form Adjusted R-Square of 55.9%. The adjusted R-square

which is the most reliable explanation of the regression equation indicated that three independent variables (PE, TE, and TW) combined explain 55.9% of the factors for quality management factors in the construction industry.

Table 5 Regression Coefficients Summary

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1	(Constant)	6.065	1.319	4.600	
	PE	.523	.050	1.466	.000
	TE	.452	.076	5.995	.000
	TWO	.343	.047	3.972	.000

a. Dependent Variable: PCI

Keywords: participation of employees, TE= Training of employees, TW= Training of employees & PCI= Performance of construction industry and below as the suggested regression model which is the final result of regression as shown in table 11 above. From the table, the following regression equation can be derived:

$$PCI = 6.065 + 0.523(PE) + 0.452(TE) + 0.343(TW) + \epsilon$$

The model suggests that when all independent variables are held constant, PCI is 6.065 supported by other factors. Thus, the model indicates a positive relationship between the dependent and independent variables for all three tested independent variables. Specifically, when other factors are held constant, PE (Participation of employees) will be affecting the performance of employees by .523 which is significant at .000 ($p < 0.001$) with a t value of 1.466. Also, when other factors are held constant, Training of Employees (TE) will be affecting the dependent variable (performance of construction industry-PCI) by .452 with a t value of 5.999 which was also significant ($p < 0.001$). Finally, when other variables are held constant Team Work (TW) will have a positive effect on the dependent variable (PCI) by the tune of .343 with a t value of 3.972 which was significant at .000. These results confirm that the variables are predictive indicators for performance at the construction industry and hence management of these companies should be advised to value training of their employees, to motivate them to work in teams and also to involve them in the daily routine of work. The data has confirmed that most workers like to be involved in decision-making at all levels of the production process.

V. DISCUSSION

➤ *Participation of Employees and Performance of the Construction Industry*

This factor was the first one to be tested by both descriptive and inferential statistics (regression results). The descriptive statistics revealed an average mean value of 4.1 for the components of participation of employees. According to previous studies, the mean value of 3.5-5.0 shows high values for the items specified (Sekaran and Bougie, 2010). Similarly, the regression results revealed a positive and significant relationship between the participation of employees (PE) and the performance of the construction industry (PCI). These results combined can be interpreted as when employees are recognized by their employer and get involved in the decision-making process, they will increase their productivity levels which will foster organizational performance. These findings are similar to (Cetindere, Duran, and Yetisen 2015). These studies reported the need of involving workers and management in making decisions regarding the quality of materials, quality surveyors and clients' preferences. Although Kongolo (2018) found workers were less engaged, their recommendations suggested including employees in management decision issues as important.

➤ *Training of Employees and Performance of the Construction Industry*

The second variable was related to the training of employees (TE). It has been reported that training of employees should be looked at as a means for improved performance, especially in this technological era where things keep changing so rapidly. The construction sector is not different either. Consequently, the study included an item related to the training of employees which has six (6) indicators /items. The results from the descriptive statistics indicated an average mean value of 3.9. Again, from prior studies, this means the value is regarded as "high" which means the respondents strongly agree with all the items in the survey. Similarly, the findings of the study from regression results revealed that the independent variable (TE) was positively related to the performance of the construction industry (PCI) as the Beta value reported a strong power value which was significant at .000. These results mean that respondents agreed with the inclusion of training into the workplace and which is again the duty of the management of the construction companies to consider and implement. Although there are studies which suggest that employees should train themselves as some will leave the job after the organization has trained them (Qiaser and Qul, 2015). However, the notions of whether to train or not to train employees remain a complex issue. Some studies have reported training employees is mandatory in all sectors to foster productivity (Jagannathan & Faisal 2019). They found that training in the construction industry results in positive outcomes to the overall company performance

➤ *The Effect of Teamwork and Performance in the Construction Industry*

The last research objective intended to explore the effect of teamwork (TW) and whether it has any effect on the performance of the construction industry. Many studies in the management field have suggested including teamwork in the equation of efficiency and productivity. However, for construction companies normally there is one main supervisor who is regarded as the engineer for the overall decision maker of the plan of construction. Henceforth, this study borrowed the idea from the management field and included it in the variables for testing. In both cases (descriptive and inferential statistics-regression results) revealed the variables to be reliable. The mean score value of all the six (6) components of teamwork revealed an average "high mean score" of 3.9. At the same time, the regression results showed that the dependent variable (teamwork—TW) had a positive relationship with the dependent variable (PCI) which confirmed that teamwork is a factor for performance measures in the construction industry. Similar results were reported by (Deepika, Anandakumar, and Krishnamoorthy, 2020) It is therefore important for construction companies to value teamwork to tap the many positive advantages including knowledge sharing and error-free work.

VI. CONCLUSION

The goal of the study was to determine how the performance of the construction industry was impacted by complete quality management. The businesses are dealing with poor employee dedication, tardiness in finishing work schedules, and persistent underperformance in terms of high-quality work. Clients of these construction companies who are mostly government departments are constantly complaining about delays and substandard work which has somehow tarnished the image of the construction companies, engineers and all the manpower involved in the process. There are factors that construction companies must consider if they have to move a step forward in terms of quality work and overall performance. Based on the results of studies examining the impact of total quality management practices on the performance of construction projects, it was advised that project managers thoroughly review their construction policies in order to include leadership elements that would improve worker performance and ensure that the project is completed on schedule and within budget.

RECOMMENDATIONS

This study makes several recommendations from the survey data. First, the productivity-enhancing variables that other management-related sectors have identified should not be separated from by construction company. Instead, they should encourage knowledge exchange among coworkers by working together. In a similar vein, frequent employee training should be conducted whether or not a person intends to quit his position and it won't cost as much to not train them as it would to train workers and the training of staff produced considerable outcomes, as shown by the study's findings.

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