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Correlation Between TQM and Triple Bottom Line (TBL): Perspectives from Construction Companies in Gauteng, South Africa

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Abstract

This paper aims to establish whether there is any correlation between total quality management (TQM) and the triple bottom line (TBL), from the perspective of construction companies in Gauteng, South Africa. The objective of the paper is to determine the ways in which organizations can use TQM principles to aid the TBL and identify the gaps that are present in terms of achieving sustainable construction. The study follows a quantitative approach using a questionnaire assessing TQM elements (customer focus, Leadership, employee involvement, process approach, continuous improvement, evidence-based approach, and relationship management) and the TBL (economic, environmental, and social sustainability). With a response rate of 71%, the findings of the study revealed that there is a positive correlation between TQM and the TBL. The study's recommendations can be used to show the impact of quality in driving sustainability from construction organizations perspective and to guide other organizations achieve their sustainability agenda.

Keywords

Total Quality Management (TQM), Triple Bottom Line (TBL), Sustainable Construction, Environmental Sustainability, Construction Industry.

1. Introduction

The fourth industrial revolution has made information easily accessible through technology and social media; the public has become more informed about what is happening in their environment, such as the depletion of natural resources, climate change, and the rise in air and water pollution. Consumers are also more mindful of the products and services that they consume or utilize. Sambo et al. (2022) note that this has altered consumer expectations and demands, encouraging them to choose high-quality goods or services from organizations that cause the least harm to the environment.

Countries worldwide are on a goal to achieve sustainable development by 203, as indicated by Weiland et al. (2021), which has put immense pressure on industries to transition into more sustainable operations while still producing products and services of exceptional quality. Based on research, sustainability is the maintenance of resources for the next generations (Hashim et al. 2023). With global problems such as climate change and an increase in poverty, resources are not infinite but very scarce. Therefore, as concluded by Hashim et al. (2023), every industry needs to play its role in maintaining these resources to save our planet.

The construction industry is a vital sector that encompasses manufacturing, trade, and various activities related to building, repairing, renovating, and maintaining infrastructure (Hussain et al. 2022). The transition to sustainable growth in the construction industry is crucial for a nation. Although the industry is one of the main drivers of

socioeconomic development, it also significantly depletes non-renewable natural resources and pollutes the environment (Omopariola et al. 2019). The construction industry contributes to resource depletion, air pollution, waste creation through raw materials, and building activities (Evans et al. 2021). However, as noted by Omopariola et al. (2022), sustainable construction attempts to minimize environmental damage while ensuring that construction has no detrimental effects on people or the environment. It is important to note that in 1994, Charles Kibert proposed the first formal definition of sustainable construction with the goal to contribute to the broader sustainable development movement by finding a solution (Du Plessis 2007). Furthermore, Goh et al. (2020) add that sustainable construction aims to achieve a harmonious and well-rounded approach to environmental, social, and economic sustainability, without allowing any one aspect to overshadow the others.

1.1 Problem Statement

Sustainable construction is an important issue, yet many organizations are not being trained to fully integrate it into their organizations resulting in poorly implemented sustainable practices or utter disregard for sustainable development World Economic Forum 2016). Organizations have been facing increasing pressure to ensure sustainability is achieved from the government and pressure from consumers for exceptional quality, thus creating a lot of confusion and frustration, especially for sectors whose operations have the most detrimental effects on the environment, such as the construction sector.

According to a seminar on the Status of the South African Construction Industry, the built environment, which includes the construction industry, is responsible for generating 30% of total greenhouse gas emissions worldwide (Dladla 2022). The author goes further and adds that it uses around 32% of the world's natural resources (Dladla 2022). It adds to the more than 500,000 yearly deaths worldwide caused by poor air quality (Dantas et al. 2021). Likita et al. (2018) highlighted that in recent years, the construction sector has been criticized for its poor manufacturing and production in comparison to other industries. The success of any industry is dependent on the TBL's profit, people, and the environment, as noted by Correira (2019); therefore, organizations need to balance TQM and sustainable development, tapping into the TBL to stay competitive.

1.3 Research Aim, Objectives, and Question

The aim of the study is to assess the relationship between TQM and TBL and to explore the TQM elements that can aid the implementation of sustainable development in line with TBL in the construction industry.

The main objective of this study is to explore the role of Total Quality Management (TQM) in achieving sustainable development within the construction industry, by identifying key TQM principles and strategies that enhance sustainability efforts.

To achieve the above main research objective, the following specific research objectives (SRO) have been established:

- (RO1) To determine the relationship between TQM and TBL.
- (RO2) To identify the TQM principles that are most significant in TBL.

Based on the above main objective, the study sought to address the following main research question: How might Total Quality Management (TQM) ideas and practices be applied to advance building sector sustainable development?

To answer the above main research question, the following specific research questions (SRQs) have been developed:

- RQ1. What is the impact of TQM on TBL?
- RQ2. What are the most prevalent gaps in TQM and TBL?

Scope, Limitations and Significance of the Study

This research delves into the topic of sustainability within the framework of the Triple Bottom Line (TBL), examining its connection to Total Quality Management (TQM) and the fourth industrial revolution. The study specifically focuses on the construction industries in Johannesburg, South Africa. Unfortunately, due to the limited number of participants, the findings cannot be applied to a larger population.

This research holds significant value as it not only delves into the construction sector but also offers valuable insights into the relationship between TQM and sustainable development across various industries. This study holds great importance for future researchers, as it pioneers the examination of the relationship between TQM and sustainable development in organizations based in Johannesburg. The results of this study have the potential to guide future researchers. The study also offers some valuable insights into South Africa's progress towards achieving the 2030 sustainable goals.

2. Literature Review

The United Nations (UN) Sustainable Development Goals (SDGs) are crucial for organizations to implement. Neglecting sustainability could harm competitiveness, as customers react negatively to poor sustainability practices (Correira 2019). For organizations to successfully navigate the challenges of the fourth industrial revolution, it is crucial for them to develop a comprehensive strategy that embraces transformation and innovation. A key aspect of this strategy is quality management, which plays a vital role in ensuring the organization's ability to adapt and thrive in this rapidly changing landscape (Djojo 2024). As highlighted by Zhang et al. (2021), TQM and sustainable development are prioritized in some organizations as their practice is crucial in both production and service organizations.

2.1 The South African Construction Sector

Between the years 2021 and 2024, the South African construction sector has faced difficult situations accentuated by the COVID-19 pandemic. In 2020, the sector contributed R136.2bn or 2.7% of the total country's GDP (Veitch 2022). However, in 2023, it contributed approximately 109.5 billion rand (equivalent to roughly 5.79 billion U.S. dollars), representing an increase compared to the previous year (Statista 2024). Despite challenges such as power outages, the industry continued to contribute 2.7% to South Africa's total GDP in 2024 (KH Plant 2024). Projections indicate growth in residential and commercial building construction from 2021 to 2024 (ConstructAfrica 2022).

When looking at the South African construction industry landscape, it is important to consider the grading system applied within the industry. The grading system of the Construction Industry Development Board (CIDB) is crucial for contractors who want to bid on construction projects in the public sector in South Africa (Construction Industry Development Board 2021). It ensures that contractors are qualified and capable, considering their financial capacity and track record. In South Africa, contractors are sorted into nine levels by the system, with level nine being the highest (Shomolekae 2022). Table 1 below shows construction companies registered under each grade in Gauteng as of 2021 (Construction Industry Development Board 2024; Veitch 2022).

Table 1. Number of Registered Contractors in Gauteng

Grade	National Total	Gauteng	Share of National Total
9	258	168	65%
7 and 8	2 494	1 018	41%
5 and 6	4 868	1 501	31%
2, 3, and 4	14 696	3 476	24%
1	76 638	17 452	23%

As an illustration, Grade 2 can manage projects up to R1,000,000 and has a proven track record of successfully completing projects valued at a minimum of R130,000. On the other hand, Grade 9 has no restrictions on project value but does require a track record of at least R90,000,000. Contractors are categorized into different groups based on their areas of expertise, including General Building, Civil Engineering, Electrical and Mechanical Engineering, and specialized works. This grading system promotes high standards, openness, and effectiveness in the construction industry, contributing to economic growth by ensuring that contractors possess the necessary qualifications for public sector projects.

2.2 Total Quality Management (TQM)

Sustainable building renovations have received a growing amount of attention over the past years. However, the academic literature focusing on the implementation of sustainable development goals in construction projects is still limited (Gade and Madsen 2020). The majority of construction Companies in Nigeria are confronted with the challenge of implementing a high-quality building plan that will meet the demands of the owner at a low and effective cost while ensuring that they continue in business without incurring debt (Egwunatum et al. 2021).

Construction companies can adopt TQM to improve productivity, occupational health, and safety and reduce costs. The construction industry addresses the three elements of sustainability, also known as the triple bottom line, in various ways. These include the environmental, social, and economic dimensions. Environmental factors in construction may include the utilization of natural resources, waste management, and water efficiency to reduce environmental damage. Social components may consider all stakeholders including workers, suppliers, and the community. economic factors involve the contribution of the construction industry to economic growth and job creation (Sader et al. 2019).

Canbay and Akman (2023) posit that total quality management (TQM) is a management approach that helps an organization attain world-class status by ensuring that goods and services meet the needs and expectations of its consumers. Additionally, Canbay and Akman (2023) as well as Abbas (2020) note that TQM aims to improve customer satisfaction in a reliable, efficient, and profitable way through quality while increasing employee participation by encouraging teamwork within the organization. A study conducted on the construction industry defines TQM as the key method to maintaining competitive excellence (Alawag 2023).

Top management needs to play the role of organizing every strategy and activity around the needs and expectations of the customers. It is responsible for developing a culture with a high rate of employee engagement (Egwunatum et al. 2021). Researchers have found some of TQM's benefits, which demonstrate strong evidence that TQM can improve organizational effectiveness, adaptability, and competitiveness and build an optimistic mindset while creating a culture of continuous improvement (Sader et al. 2019).

TQM elements include customer focus and satisfaction, leadership, engagement of people, process approach, relationship management, evidence-based decision-making, and quality improvement.

- ***Customer Focus:*** TQM prioritizes recognizing and fulfilling current and future customer needs. As a customer-oriented practice, it emphasizes the importance of customer focus (Budayan and Okudan 2022).
- ***Leadership:*** Leadership as a TQM element focuses on establishing unity of purpose where people within the organization are involved in achieving the company's quality objectives (Sader et al. 2019). Additionally, Saxena (2019) notes that leaders ensure that the TQM model is introduced and reinforced correctly.
- ***Employee involvement:*** People are the most crucial factor for an organization's success. Only when people are fully engaged can an organization establish sustained success. Top management should always remember that full inclusion of employees and a good selection of staff is the most important managerial decision (Luburić 2015).
- ***Relationship management:*** Relationship management, an element of TQM, helps improve the production supply chain and ensures a smooth and consistent flow of products and services to customers. This helps organizations achieve maximum coordination among production partners and stakeholders (Sader et al. 2019).
- ***Continuous improvement:*** Constant improvements are vital. Neglecting quality will lag competition. The solution continually improves customer orientation, employee engagement, leadership, and processes. This requires a synergistic approach, forecasting the demands and expectations of users and stakeholders. Accurate forecasting is crucial for success (Luburić 2015).
- ***Evidence-based approach:*** Making decisions based on data analysis and evaluation is crucial to achieving desired results. With accurate information, organisations can confidently make informed decisions that will positively impact their goals (Luburić 2015).
- ***Process approach:*** Business processes can be highly effective and efficient when operations are interconnected and consistent. By defining the desired outcomes and working towards achieving them, system performance can be enhanced (Sader et al. 2019).

2.3 Sustainable Development and Triple Bottom Line

Environmental challenges and population growth are depleting resources such as water and waste disposal. This has increased the need for sustainability and sustainable practices worldwide (Correia 2019). Sustainability means a capacity to maintain some outcome or process over time. However, in development literature, most researchers apply the concept to mean advancing and sustaining a healthy economic, environmental, and social system for human development (Sader et al. 2019; Canbay and Akman 2023; Abbas 2020; Alawag et al. 2023; Budayan and Okudan 2022). Sustainable development, therefore, is a development approach that uses resources in a way that allows them to continue to exist for future generations. A social sciences journal defines sustainable development as “development that can be continued either indefinitely or for the given time (Mensah 2019).

According to Siekmann et al. (2023), companies that invest in organisational sustainability perform better, sell more to their customers, and can compete more effectively, therefore achieving their TBL. The concept of a sustainable environment focuses on corporate efforts to protect nature for future generations. It also investigates the environmental impact of corporate operations, natural resource exploitation, and preservation (Zhang et al. 2021). This means that using resources efficiently and sparingly, as well as energizing a sustainable environment, is critical for the existence of generations to come. Companies cannot ignore their ethical obligations to society and the environment. Therefore, different stakeholders, such as the government, societies, and customers, require organizations to participate in "society-environment-enhancing initiatives" to balance the adverse effects of their operations. Companies that take

the initiative to keep the environment safe have a better effect on their customers and a satisfied workforce (Albloushi et al. 2022).

Understanding the significance of the blue economy in sustainable development emphasizes the need to find a balance between economic, social, and environmental factors, commonly referred to as the Triple Bottom Line (3BL). A study conducted in Pakistan highlighted importance of utilizing blue resources for integrated development approaches Gill and Iqbal 2021). A conceptual framework has been developed to assess sustainability practices in printing companies. This framework aims to guide businesses towards sustainable development practices by integrating environmental, social, and economic aspects into their operations (De Lima and Da Costa 2015). A comprehensive analysis of green logistics highlights the importance of sustainability in the field. It emphasizes that adopting environmentally friendly practices not only enhances economic performance, but also brings about social and environmental advantages. The review highlights the significance of incorporating 3BL (Triple Bottom Line) in logistics operations (Lazrak and Amrani 2023). A study by Setiawan (2019) emphasizes the importance of the Triple Bottom Line (3BL) in achieving long-term success, highlighting how sustainability and competitive advantage are interconnected in the logistics industry. The research suggests that integrating sustainable development practices within supply chains is essential for sustained success. The review of indicators for sustainable manufacturing provides a comprehensive range of metrics that industries can utilize to assess and enhance their sustainability performance. Manufacturing companies must prioritize adopting sustainable practices to meet the 3BL criteria (Schamer et al. 2023).

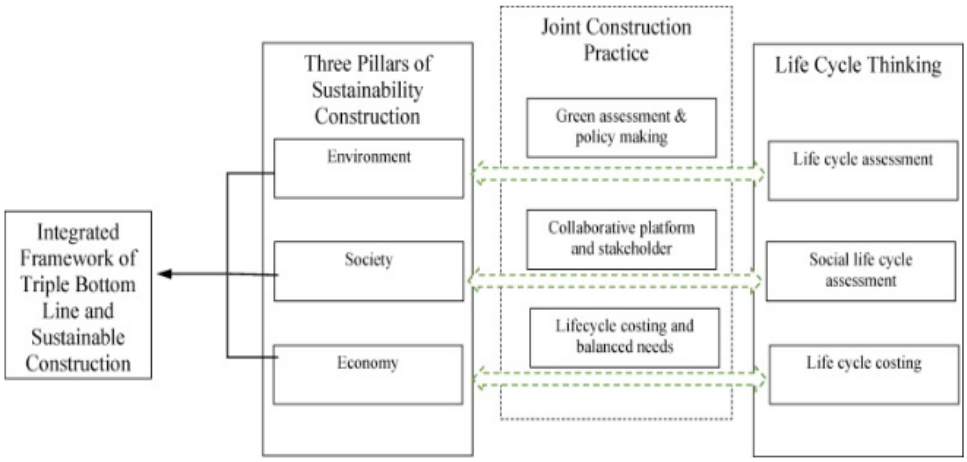


Figure 1. Integrated framework Combining TBL and Sustainable Construction (Goh et al. 2020)

A comprehensive framework, as shown in the above figure, has been put forward to emphasize the possible gaps and needs to promote sustainable construction practices in the future (Goh et al. 2020). The proposed integrated framework incorporates life cycle thinking, which enhances the achievement of sustainable development goals in a more comprehensive way. This approach emphasizes the importance of considering the entire life cycle to promote sustainable development (Goh 2017; Ingrao et al. 2018). Adopting a life cycle approach helps to integrate sustainable practices more effectively in construction companies.

2.4 Conceptual Framework

The conceptual framework of the study depicted in Figure 2 was developed based on the literature review. The framework depicts the analysis conducted through this study to show how TQM practices impact the sustainability outcomes of construction companies in Gauteng, South Africa. In essence, the framework acts as a helpful tool for researchers to explore how quality management practices can contribute to achieving sustainability in the construction industry.

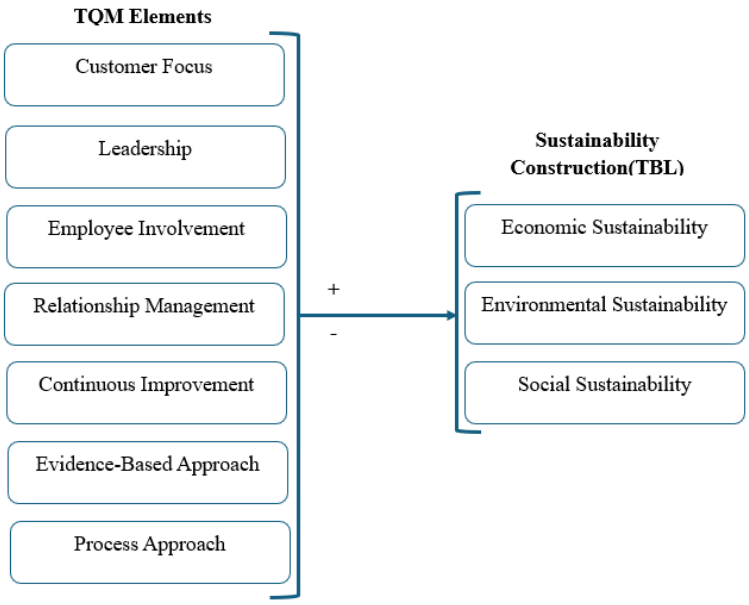


Figure 2. Conceptual Framework

3. Methods

3.1. Research Approach

This study has been designed using a quantitative approach. This method is faster and allows for the collection of a large amount of data, even from a distance. Participants tend to feel more at ease when responding to the questions. However, while this data can reveal patterns, it does not provide explanations for those patterns (Queirós et al. 2017).

3.2. Data Collection and Analysis

Data was collected in Gauteng, with a particular emphasis on Johannesburg because it faces significant environmental challenges. Johannesburg, known for its high levels of pollution ("Johannesburg Air Quality Index (AQI) and South Africa Air Pollution | IQAir" 2024), offers an interesting setting to explore the relationship between Total Quality Management (TQM) and the Triple Bottom Line (TBL) in the construction industry. Johannesburg was selected strategically due to its high pollution levels, which emphasize the pressing need for sustainable practices. This makes it the perfect location to study the impact of TQM on environmental, social, and economic outcomes.

Data was collected using questionnaires structured to collect responses using a 5-Likert scale, Yes or No responses, and single-selection questions. Questions were divided into constructs identified in the conceptual framework. The first section of the questionnaire looks at the demographic of the respondents. The second part assesses the organization's understanding of TQM. The third part covers TQM principles. And the last part involves sustainable development in line with TBL.The reliability of the questionnaire was tested using Cronbach's alpha test. Data was analyzed using SPSS to provide descriptive statistics and Pearson's correlation coefficient as well as test reliability.

3.3. Population and Sample Size

The population targeted for this study included construction companies in Johannesburg which were profiled by Who Owns Whom (Veitch 2022). The sample size was selected using convenient sampling by picking the companies straight from the database, however, the following inclusion and exclusion criteria were considered: (1) companies should be amongst Grades 9, 7 & 8 (refer to Table 1 on Page 3), (2) located in Gauteng, and (3) having a national footprint. The questionnaires were distributed to construction companies in Johannesburg via email and dropped at the companies' premises. 42 set of questionnaires were distributed.

4. Results and Discussion

4.1 Reliability

Cronbach's alpha coefficient was used to assess the reliability of findings and ensure the accuracy of the results. This statistical measure is commonly used to evaluate the consistency of a research tool. For a study to be acceptable, it

must return a Cronbach alpha of 0.70 and above (Amirrudin et al. 2020). Table 2 shows the results of Cronbach's Alpha test.

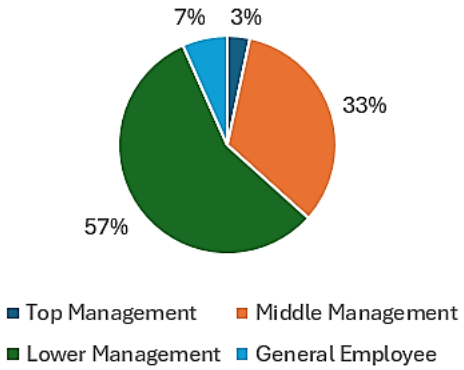
Table 2. Cronbach's Alpha Results

TQM Elements and Sustainability Development	Cronbach's Alpha	Interpretation
Leadership	0.87	Good
Employee Involvement	0.75	Acceptable
Process Management	0.75	Acceptable
Relationship Management	0.71	Acceptable
Continuous Improvement	0.69	Acceptable
Evidence-Based Approach	0.54	Unacceptable
Customer Focus	0.75	Acceptable
Economic Sustainability	0.76	Acceptable
Social Sustainability	0.76	Acceptable
Environmental Sustainability	0.67	Acceptable

In general, most TQM elements and sustainability factors in the study demonstrate acceptable or good reliability. However, it is worth noting that the evidence-based approach falls short in terms of reliability.

4.2 Demographic Information

A total of 30 successfully completed questionnaires were received form the study participants from a total of 42 that were distributed. Most of the survey participants were low-level managers, followed by middle-class managers with detailed response rate as shown in Figure 3. The participants came from diverse organizations in term of employee headcount. Figure 4 depict the different organizations the respondents belonged to in terms of headcount. The organizations that responded to the questionnaires mostly had 1-30 employees. 13 organizations had 1-30 employees, 8 organizations had 30-100 employees, and only 8 of the organizations who responded had more than 100 employees. This shows that most of the organizations that responded are small construction companies.



-Figure 3. Participants Position Within Their Organizations

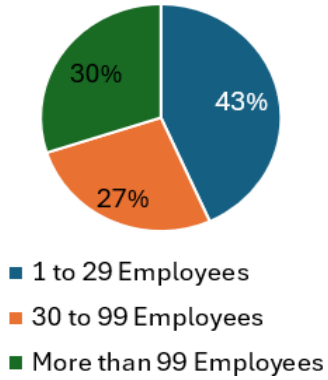


Figure 4. Organization Size

4.3 Discussion of Findings

4.3.1 TQM Presence in Organisations

The presence of a TQM system in the organizations is depicted in Figure 4 above. Out of the 30 responses, 60% of organizations confirmed that they have a TQM system in place, 37% said they do not, and 3% were not sure if their organization has a TQM system. Many organizations within the construction industry have already established a Total Quality Management system, indicating that a growing number of organizations are striving towards quality.

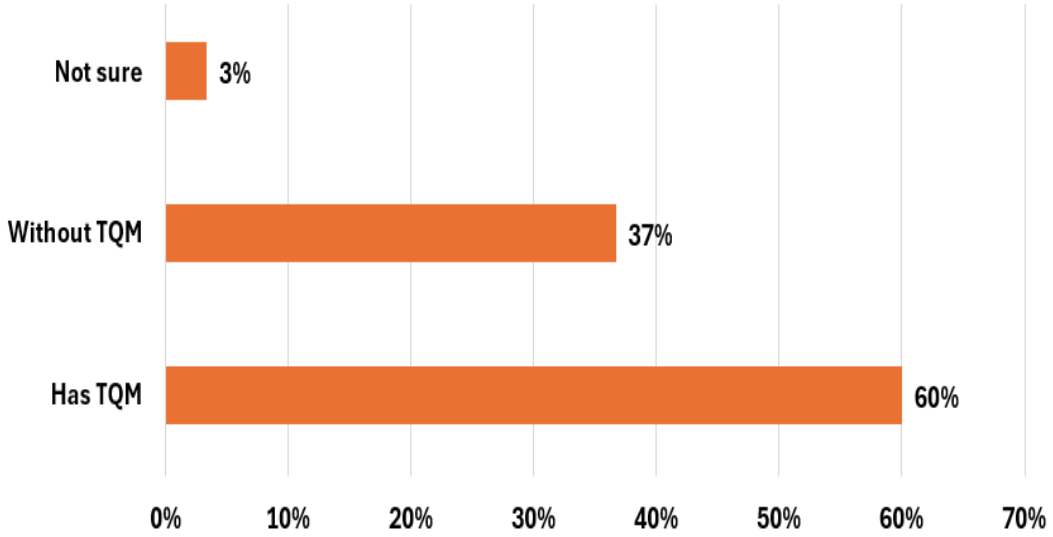


Figure 5. TQM In the Organisations

4.3.2 Principles of Total Quality Management

Leadership Commitment:

According to the study, it was found that clear communication is highly valued by 50% of organizations. Out of this percentage, 33% strongly agree while 13% disagree. A significant majority, 90%, of individuals express a positive attitude towards organizational quality. 33% of respondents strongly agree and 27% agree that top management supports TQM initiatives. In addition, a significant portion of respondents, 37% to be exact, agree that top management places a high importance on quality rather than solely focusing on production. Furthermore, an additional 30% strongly agree with this sentiment. It is worth mentioning that a significant majority of organizations, specifically 80%, have reported that their leaders are actively promoting sustainable practices.

Employee Commitment:

Employee commitment within organizations appears to be strongly supported by several key factors. Employees generally perceive recruitment procedures to be fair, reflecting a sense of transparency and equity in the hiring process. Furthermore, organizations demonstrate a commitment to employees' quality of life, as evidenced by 42% of employees strongly agreeing and 48% agreeing with this sentiment. This supportive environment extends to decision-making processes, where 47% of employees strongly agree and 30% agree that they are encouraged to contribute ideas. Additionally, a robust organizational culture is recognized, with 57% of employees strongly agreeing and 40% agreeing that their workplace fosters a healthy culture. Finally, the provision of benefits is another area where organizations excel, with 43% of employees strongly agreeing and 53% agreeing that adequate benefits are provided.

Process Management:

Quality measurement methods have been widely accepted, with 40% strongly agreeing and 43% agreeing. Process audits are conducted in 37% of organizations and frequently in 30% of organizations. A majority of respondents, 83%, highly value standardized operating procedures, while an even higher percentage, 94%, have implemented preventative strategies to minimize inefficiencies. Most organizations consider their process management approach to be highly effective, especially when it comes to identifying and addressing risks.

Resource Management:

A significant number of organizations actively engage with stakeholders, with a majority expressing agreement on the importance of having strategies in place to effectively manage relationships. 47% of individuals agree on engagement with stakeholders, while 43% strongly agree. 67% of organizations choose to communicate their sustainability efforts on their company websites, while a significant 90% have implemented systems to measure supplier performance.

Continuous Improvement is widely supported, with 47% strongly agreeing and another 47% agreeing. A majority of the organization, with 53% agreeing and 33% strongly agreeing, is open to embracing change in its culture. 93% of individuals actively engage in knowledge sharing to foster continuous improvement, while 86% consistently assess

and review their quality improvement objectives. Every organization keeps track of their quality and sustainability progress using different methods.

Evidence-based Approach is utilized, with data analysis being conducted frequently by 47% and consistently by 30%. Data plays a crucial role in decision-making, and it is universally recognized as a vital component for all organizations. Making sure that data is accurate is a top concern for most people. Many organizations make it a point to track and analyse customer feedback, often conducting cost-benefit analysis in the process.

Customer Satisfaction is a top priority for 97% of organizations, as all respondents have confirmed their commitment to customer-centric strategies. 53% of respondents strongly agree and 40% agree that continuous efforts to meet customer needs are important. Customer satisfaction surveys are regularly conducted, with 43% strongly agreeing and 47% agreeing. Many organizations take customer preferences into account when developing their products or services.

4.3.3 Triple-Bottom Line

Environment Sustainability:

Organizations proudly report their commitment to environmental sustainability, ensuring that they comply with all environmental standards and diligently monitor their impact on the environment. Our practices prioritize the environment, with a significant majority of 97% incorporating environmentally friendly methods. Additionally, 93% of our efforts are dedicated to promoting resource conservation. Many organizations choose to follow a formal environmental policy.

Social Sustainability:

Community development programs are widely embraced by 94% of organizations, showcasing their commitment to social sustainability. All participants have confirmed that they adhere to ethical labour practices and prioritize the safety of their employees. Organizations excel in promoting diversity and place a high priority on employee well-being, as evidenced by 40% strongly agreeing on the importance of work-life balance. It is quite common to collaborate with stakeholders on social issues.

Economic Sustainability:

Investing in sustainable practices is reported by 53% of respondents, highlighting the importance of economic sustainability. 40% of individuals strongly agree on the importance of long-term sustainability strategies. Approximately 76.7% of individuals practice regular review of cost structures while ensuring quality is maintained. Approximately 90% of companies have implemented financial risk management strategies, while 86.7% have developed contingency plans to address quality-related issues.

4.3.4 Relationship betweenTQM and TBL

As shown in Table 3 below, Evidence-Based Approach demonstrates the highest relevance to Economic Sustainability (0.804), indicating that this TQM principle is highly significant for achieving favorable economic outcomes. In contrast, Employee Commitment is most strongly associated with Environmental Sustainability (0.710), suggesting a robust link between employee involvement and positive environmental impacts. Process Management stands out for its strong connection with Social Sustainability (0.725), underscoring its critical role in enhancing social aspects within organizations. On the other hand, Continuous Improvement has a relatively lower impact on Environmental Sustainability (0.219) compared to the other dimensions, indicating that this principle may primarily focus on operational and quality improvements rather than directly addressing environmental concerns.

Table 3. Correlation between TQM and TBL

TBL / TQM Principles	Environmental Sustainability	Social Sustainability	Economic Sustainability
Leadership	0.411	0.471	0.409
Employee Commitment	0.710	0.549	0.413
Process Management	0.539	0.725	0.639
Continuous Improvement	0.219	0.609	0.425
Evidence-Based Approach	0.361	0.721	0.804
Customer Focus	0.379	0.484	0.479

5. Conclusion

The study aimed to investigate how Total Quality Management (TQM) and sustainable development are connected in the construction industry, particularly in Gauteng, South Africa. The main goal was to find the main principles of Total Quality Management (TQM) that contribute to the three dimensions of the Triple Bottom Line (TBL) - Environmental, Social, and Economic Sustainability. The aim was also to evaluate how these principles can help in implementing sustainable development practices.

The findings showed that different TQM principles have a significant but varied impact on the three dimensions of sustainability. The Evidence-Based Approach showed the strongest correlation with Economic Sustainability, indicating that making decisions based on data is essential for achieving economic goals. It is important to engage employees in environmental initiatives because their commitment has been shown to have a strong association with environmental sustainability. Process Management has been found to have a significant impact on improving Social Sustainability. This is because it plays a crucial role in promoting fair and effective organizational practices.

Although there were positive correlations found, the study showed that relying solely on TQM may not be enough to achieve complete sustainability. Although TQM principles can greatly improve the social and economic aspects of sustainability, their effect on environmental sustainability is not as strong. This is evident from the relatively lower importance of Continuous Improvement in this particular area. So, although TQM is a useful framework for promoting sustainability, it's important to combine it with other strategies and measures to fully tackle the complexities of sustainable development.

Future researchers could improve their study by including a wider range of participants from various regions and industries. This would help to make the findings more applicable to a larger population. In addition, it would be beneficial for future studies to investigate how TQM can be combined with other management frameworks and practices in order to create a more holistic approach towards achieving sustainability. Studying the long-term effects of implementing Total Quality Management (TQM) on sustainability outcomes could offer valuable insights for organizations looking to embrace sustainable practices.

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