

UNDERSTANDING TQM IMPLEMENTATION BARRIERS INVOLVING CONSTRUCTION COMPANIES IN A DIFFICULT ENVIRONMENT

Purpose

This paper identifies the factors that affect TQM implementation in construction companies and it suggests solutions for TQM implementation in a difficult environment.

Design

Studies were carried out at six large construction companies who ply their trade in Southern Africa and in-depth investigations were conducted to assess TQM implementation practices and associated TQM barriers. Interviews were conducted on directors and key personnel that play important roles in TQM implementation in their respective organisations. The empirical study also utilised a number of organisational documents which added rigour to the findings.

Findings

This study identified three core categories and ten main barriers affecting TQM implementation in Southern Africa construction companies. The core categories are motivation, infrastructure and penchants and tendencies while the factors are lack of quality support, poor TQM knowledge and TQM awareness, poor information sharing, temporary workers, overdependence on contract document, poor data collection measurement, undefined TQM roles and responsibilities, award to lowest bidder tendency, poor business environment and corruption.

Limitations

The study was conducted based on companies plying their trade in Southern Africa and mostly around Malawi, Zambia and Mozambique. It does not study companies in Namibia, Zimbabwe, Angola, South Africa and Botswana.

Practical implications

TQM cannot be exported wholly from another region to a new setting without taking into consideration the local factors associated with that setting. For successful TQM implementation in construction in Southern Africa, characteristics of this region have to be known. This study illuminates a number of TQM implementation barriers associated with construction especially applied to this difficult environment. Application of this knowledge would enhance TQM and heighten competitive advantage initiatives. The proportions highlighted in this study therefore help build up the TQM implementation awareness.

Originality/ value

The factors identified in this study are based on current TQM implementation practices at established construction companies in Southern Africa. They provide a practical basis for guiding TQM in construction companies operating in difficult environments.

Key words: *Total Quality Management, TQM barriers, construction companies, Southern Africa.*

Type of paper: research paper

BACKGROUND

Quality management involves a set of quality activities which are undertaken in the production of a product, process or service and it covers prevention and appraisal (Battikha, 2003). It is a long term journey and a way of thinking about management of organisations and a complete way of improving total performance and quality by organisations (Fotopoulos & Psomas, 2010). Quality management has a very significant bearing on a construction project's performance with regard to its context within the triple constraints of time, cost and scope (Baratta, 2006).

In construction, projects are often characterised with one-of-a-kind attributes due the uniqueness of every project. This emphasises the need to have appropriate quality management systems in place. A number of frameworks, models and tools for managing quality such as the Malcom Baldrige National Quality Award (MBNQA) Program and European Framework for Quality Management (EFQM) feature heavily in literature (Ahmed et al., 2005; Yang et al., 2010). However, the degree to which Southern African construction stakeholders go in quality management of products and services is sparse in literature (Kikwasi, 2011). The construction industry has remained slow in the implementation of TQM and usually focuses on quality assurance (Haupt and Whiteman, 2004). Usually, the industry confuses TQM with Quality Control (QC) and Quality Assurance (QA) standards such as ISO 9000, as equivalent to practicing TQM (Silvestro, 2001). Harrington et al. (2012) argues that QC and QA are applied mostly during construction projects and do not represent all the elements of TQM which is broader and more comprehensive.

Quality management problems are prevalent in most parts of the world as far as construction is concerned. The industry's poor performance is evident in waste, rework and low levels of customer satisfaction (Harrington et al, 2012). However, the problem is worse in Southern Africa due to lack of adequate research and quality management initiatives undertaken in this part of the world (Kikwasi, 2011). Despite the industry focusing on quality assurance, quality problems still prevail and there is need to do more than what was being undertaken. These no longer meet the needs of construction sites as highlighted by the

persistent presence of quality failures and there was need for a practical self-control method and developing a quality culture within the organisation.

TQM

Literature addresses the TQM factor elements necessary for the implementation of TQM ensuring continued success and survivor of the organisation. These factors are hereby referred to as Critical Success Factors (CSF).

Leadership and top management commitment: Commitment by leadership and top management towards quality involves providing a stimulating vision, guiding quality values, encouragement, and quality direction to subordinates in a manner that is understood by all. Leadership and top management commitment also should involve cross functional system approach, making decisions based on fact and motivating employees for TQM (Harrington et al., 2012; Fotopoulos & Psomas, 2010; Drew & Healy, 2006; Ahmed et al., 2005; Tari, 2005; Kumar & Sharma, 2017). Haupt & Whiteman (2004) said that high commitment by leadership and top management in the organisation is a strong prerequisite for successful TQM implementation in construction. Quality leadership involvement in all crucial stages of the construction process, from procurement to implementation and maintenance, is critical for the success of the project and achievement of quality goals and outcomes. Low and Teo (2004) said that managers have to adopt the appropriate leadership styles for each project and no single management style is applicable to all circumstances and all projects.

Training: Training programs should target everyone in the organisation teaching them what TQM stands for, how TQM works and what are TQM tools. Topics should include cause and effect analysis, team problem solving, interpersonal communication, statistical methods, cost of quality measurement and collection and evaluation of quantitative methods (Harrington et al., 2012). Other areas that require training include training in new technology, changes in tasks and changes in workloads. Kumar et al. (2009) said that a systematic model of training consists of four main stages; assessment phase, planning and design phase, implementation and lastly the evaluation phase. Lack of appropriate skills in construction and poor quality have been linked to poor training efforts especially among contractors (Kikwasi, 2011, Kulemeka, 2010). While most construction companies focus on profits, a considerable investment in training is required for all participants in the organisation.

Communication: Good communication is necessary in order to drive out fear, and increase confidence in workers. An employee should know why his/her work has been rejected or why his work is important. Employees should be able to openly convey innovative ideas pertaining to their work as well as convey their concerns. Good communication provides vital feedback to management on their quality efforts (Sharma & Kodali, 2008). Good communication in construction is necessary because construction projects are usually geographically diverse and involves the congregation of different professionals. Interaction between project stakeholders such as contractors, clients, consultants and suppliers especially on TQM related issues is of paramount importance and lack of effective

communication is seen as a major contributor to a project's poor quality performance (Ahmed et al., 2005). Project and organisational structures play a very critical role in the flow of information. Rigidity or flexibility of the contract management structure determines the communication actions of project stakeholders (Willar, 2017).

Customer focus and satisfaction: The first step of customer focus and satisfaction involves finding out what the customer wants and expects and measuring the level of customer satisfaction so as to help eliminate dissatisfaction. Activities include understanding customer requirements, aesthetic design, design for maintainability, reliability and service, elimination of complaints, after sales service and guarantees and warranties (Sharma & Kodali, 2008; Harrington et al., 2012; Fotopoulos & Psomas, 2010). Contracting companies have to meet the expectations of clients by matching performance with the expectations of customers. This can be achieved by understanding customer needs, varying expectations and communicating with clients effectively. Achieving customer satisfaction can help increase the organisation's market share, enforce organisational culture and improve competitive advantage (Kumar et al., 2009; McCrory et al., 2017). Customer satisfaction is a key issue for the improvement efforts. Since customer needs can evolve during execution of a project, efforts to improve the quality provision have to reflect the needs of the customer. So customer satisfaction can be regarded as a key organisational objective or a measurement tool for TQM (Drew & Healy, 2006). Suef et al. (2017) utilised QFD approaches in assessing customer need using complaints, claims and innovations. Customer satisfaction can be measured using feedback, complaints, compliments, focus groups, surveys, questionnaires and interviews (Tari, 2005; Yang, 2006).

Measurement, quality tools and techniques: These measures and controls give the organisation a baseline for assessing performance, improvements as well as declines in performance. The tools and techniques include flow chart, scatter and relations diagrams, pareto analysis, check sheet, histograms, stratification, cause and effect analysis, force field analysis, emphasis curve, control charts and Quality Function Deployment (Fotopoulos & Psomas, 2010; Drew & Healy, 2006; Tari, 2005; Yang, 2006). Information gathered from the measurements can be analysed and utilised for the monitoring and evaluation of strategies, quality costs, customer satisfaction, employee performance, continuous improvement, supplier and subcontractor performance, quality assurance and control and overall organisational performance (Ahmed et al., 2005, Chatzipetrou & Moschidis, 2017; Aigbavboa & Thwala, 2014).

Continuous improvement: Plan-Do-Check-Act is one way of ensuring continuous improvement. A similar approach is the Record-Use-Analyse-Act. It encourages measurement and recording of all processes, using the recorded data, analysing the data using basic tools and acting on the data that has been analysed. Benchmarking, measuring improvement against a predetermined criteria is also an important method in continuous improvement. The process for improvement involves identifying a problem area, collecting and analysing data on process, examining the process flow chart, analysing causes of problem, replanning the process and implementing the new process. Statistical process

control, affinity diagrams, failure mode, effects and criticality analysis, matrix diagrams, arrow diagrams, Taguchi methods for process improvement and six sigma help in replanning the process and redesign (Ahmed et al., 2005; Tari, 2005, Dinmohammadi et al., 2016, Oakland, 2003).

Design for quality: Quality design of processes, services and products helps add value to clients and benefit the organisation through enhanced competitive advantage. The design process is continuous, (Fotopoulos & Psomas , 2010). Good design of plant and equipment helps prevent defects waste and reworks and enhance variability, ease of use and maintainability. Design takes into account the need, developing concepts, prototypes and configurations of people, materials and equipment, checking and ensuring conformance to the need (Oakland, 2003; Drew & Healy , 2006).

Employee empowerment: Employees can be empowered by giving them an open working environment. Satisfied employees will achieve quality objectives better than fearful disgruntled workers. Literature has said that employee empowerment is a prerequisite for successful TQM implementation (Harrington et al., 2012; Fotopoulos & Psomas, 2010; Kumar et al., 2009). Drew & Healy (2006) said that employee empowerment encompasses having employees assume more authority, more control and more freedom to perform their duties. Ahmed et al. (2005) said that however giving employees more control works contrary to traditional management of control, rigid hierachy and following orders as prescribed by seniors. However, Tari (2005) emphasises the need to have a redistributive, empowering structure whereby trust and partnership are emphasised. Oakland (2003) argued that it is not easy to empower employees but rather management can create an environment whereby employees can take more responsibility. For construction, the construction nature of assembling a number of specialist workers at differing locations who are disbanded and reassembled within short to medium periods, poses a challenge to employee empowerment. This is worsened by aspects of subcontracting and transitory workforce meaning that empowerment has to be applied at project level beyond organisation's boundaries (Loiy, 2012).

Supplier and subcontractor involvement: Suppliers and subcontractors must be carefully identified and close and long term working relationships must be maintained with them in order to achieve best economy and quality. This involves valuing suppliers and subcontractors as partners, trade relationships, supplier and subcontractor quality assurance, supplier and subcontractor evaluation and /or certification, supplier and subcontractor involvement in design and planning and responsiveness and flexibility (Sharma & Kodali, 2008; Drew & Healy, 2006; Ahmed et al., 2005; Yang, 2006). By establishing long term partnership with suppliers and subcontractors, providing adequate TQM training, communication quality objectives, sustainable competitive advantages and increased customer satisfaction are experienced. Knowledge sharing, TQM learning and increased competencies and skills also result (Tari, 2005).

Strategic quality planning: Strategic quality planning gives organisations the competitive edge from competitors since products can easily be copied by competitors. Strategic quality

planning is part of the strategic plan of the organisation and quality statements include vision, mission and action plan statements. It should be planned to ensure competitiveness and sustainability (Green et al., 2005; Drew & Healy, 2006).

Quality assurance: According to the American National Standards Institute (ANSI, 2008), quality assurance is the planned and systematic activities designed to give confidence of organisational outputs so that they meet customer satisfaction. It covers all activities, such as testing, detection and inspection, designed to ensure that the product fulfills customer requirements such as design, distribution, manufacturing and maintenance of a product or services. (Loiy, 2012; Sharma & Kodali, 2008). The specification helps the product or service to be designed, produced or constructed using specified equipment, techniques, technology and methods. Specifications and standards encompass performance expectations, dimensions and specified parameters, material requirements, methodology, inspection, testing and quality checks, (Oakland, 2003; Chiarini, 2017; Fotopoulos & Psomas, 2010).

For TQM to flourish in an organisation the above mentioned CSF's needed to be considered and attempted.

Table 1: TQM Soft and Hard Concepts (Source: Vouzas and Psychogios, 2007)

TQM "SOFT" CONCEPTS	TQM "HARD" PRACTICES
Total employee involvement	Statistical process control
Continuous improvement	Quality function deployment
Continuous training	ISO 9000 series
Teamwork	Pareto analysis
Empowerment	Matrix diagram
Top-management commitment & support	Histograms and process charts
Democratic management style	Tree decision diagram
Customer/citizen satisfaction	Critical path analysis
Culture change	Fishbone or Ishikawa diagram

A study by Prajogo & McDemmot (2005) showed that there is no significant difference in relationship between TQM and quality performance in the manufacturing compared to the service sector firms. This means that TQM applied to the manufacturing sector can be applied to the service sector and viceversa. Ahmed et al. (2005) showed that a quality

management system strongly depends on top management commitment, customer focus and quantifying improvements using good quality tools. Fotopoulos & Psomas (2009) concluded in their study that "soft" TQM concepts play a major role in quality management system compared to "hard" concepts which were inferior but not insignificant. Quality tools and techniques ("hard" concepts) alone cannot lead to quality improvement. So there was a need to have a good balance of "soft" and "hard" TQM concepts in order to have a successful TQM implementation program.

TQM was influenced not only by organisational culture but also by national culture (Psychogios, 2010). There had been instances when TQM implementation failed because it was wholly imported from country of origin to host country without adapting it to local culture. For instance, in Anglo-Saxon management systems individual work was valued more while in most non- Anglo-Saxon cultures, interpersonal relationships were more valued than individual work (Psychogios, 2010). Some of the cultural dimensions to influence TQM implementation are power distance and uncertainty avoidance and how much space the workers were being allowed to make decisions and improvements (Jung & Hong, 2008).

TQM, CONSTRUCTION AND ITS BARRIERS

Ibrahim et. al. (2010) define construction as activities that generate physical infrastructure, immobile structures and other related activities. It is characterized by on site production of complex, one-of-a-kind products, which is performed by cooperation of provisional, multi skilled teams. Construction is guided by the contract and uncertainty looms high. Unlike in manufacturing where the product is usually movable, in construction, the product is fixed and large and resources are moving in and out. The construction industry is entwined heavily with other sectors of countries' economies. It also interacts with almost every human being's undertakings. The construction industry has remained slow in the implementation of TQM and usually focuses on quality assurance (Haupt and Whiteman, 2004). Usually, the industry confuses TQM with quality control (QC) and quality assurance (QA) standards such as ISO 9000, as equivalent to practicing TQM (Silvestro, 2001). Some countries enforce ISO 9000 certification as a requirement for qualification criteria for contracts in a particular category so as to enforce quality assurance. Santos and Escanciano (2002) state that most European Union regulations demand ISO 9000 certification. However, the empirical results are contradictory. For instance most companies adopt the measure just to win contracts with no expectation of improving quality further. Certification helps produce a product in a consistent way but does not guarantee customer satisfaction (Magd, 2008). This entails a need to incorporate TQM principles. TQM is widely considered as an assist of good performance after being successfully implemented in the manufacturing industry. This has pushed the construction industry to adopt the TQM principles so as to deal with the complexities, challenges and changes in the work environment (Love et al., 2004).

A number of barriers in literature are highlighted when implementing TQM in the construction environment. A look at literature concerning barriers in construction revealed

that the barriers can be categorised into three main characteristics namely: working environment, organisational and external stakeholders.

- a. Working environment: Hoonakker et al. (2010) said TQM in construction was hampered by lack of standardisation and the numerous players involved in construction activities. In construction, the industry is characterized by male domination, demanding working conditions, insecurity of employment, fragmentation, hierachical and adversial culture (Loiy, 2012). The industry is composed of the self employed, small, medium and large companies whereby there is no significant market leader. Its products are one-offs and occur in differing locations. Tey and Ooi (2014) mentioned a number of barriers affecting the Malaysian construction industry being lack of knowledgeable personnel, low bid way of thinking and communication huddles among the working environment elements.
- b. Organisational: Haupt and Whiteman (2004) highlights the TQM inhibiting factors in construction being: lack of adequate funds, a failure to incorporate quality in planning, lack of adequate training for staff and limited incentives for quality minded personnel on projects. Major hindrances of transferring TQM from head office to field operations being: too much paperwork, suppliers and subcontractors not being interested in TQM, difficulty in checking results, transient workforce, tight schedules, low regard for TQM by field officers among others. Projects, when they start the focus is to finish as early as possible while producing the most revenue. Usually quality is inspected after completion of a product. However, quality has to be built into the product from the beginning. McCollough and Benson (1993) highlighted five main barriers in construction as lack of trained workers, competition, poor planing and specification, poor attitudes and lack of competent managers. A study by Bhat and Rajashekhar (2009) revealed that the major barriers to TQM implementation in Indian industries are no benchmarking of other organisations, employee resistance to change, poor planning, lack of focus on customers and lack of resources. Magd (2008) outlines lack of top management commitment and lack of qualified personnel as the major barriers to effective TQM implementation in Egypt. This study looks at the applicability of some of these barriers to the Southern African construction environment.
- c. External stakeholders: The construction industry is faced with the task of coordinating complex and diverse arrangements involving clients, suppliers and subcontractors especially during large construction projects. These complexities are worsened in situations where there is frequent changes in suppliers and subcontractors, where payments are done very late by clients and where knowledge is not shared accordingly (Sundquist et al., 2012; Loiy, 2012). Engagement of subcontractors and supplier based on low bids and prices has been highlighted as a major hinderance to TQM implementation in construction (Haupt and Whiteman, 2004; Ankrah et al., 2009). In addition, the lack of interest by the external

stakeholders in pursuing TQM programs during projects hampers efforts to enhance TQM.

SOUTHERN AFRICA AND LEAST DEVELOPED COUNTRIES

Reports show a persistent presence of quality failures and potential quality problems in Southern Africa (Kulemeka, 2010; Coda & Partners, 2008; Kululanga & Kuotcha, 2010; Joubert et al., 2005). Top management show little commitment to TQM initiatives and only focuses on profit as shown by studies in South Africa and Botswana (Grobbelaar, 2001; Ngowi, 2000). There are persistent shortages of skilled personnel in sub-Saharan Africa demonstrated by studies and reports in Tanzania (Kikwasi, 2011), Malawi (Kulemeka, 2010) and South Africa (Grobbelaar, 2001). Ngowi (2000) determined that there was a defeatist culture in the Botswana towards TQM as innovation was suppressed by high power distance and high standardisation. Mersha (1997) lists the TQM inhibiting factors in least developed countries being bureaucratic government control, lack of competition, poor knowledge base, scarce capital, lack of foreign exchange and poor political environment. Similar recent studies in a least developed country but not in Southern Africa, Yemen, shows that some companies are practising variant levels of some TQM practices especially customer focus. The least practised TQM endeavour was continuous improvement (Aamer et al., 2017). TQM elements imported from elsewhere had been seen to fail if implemented without taking into consideration the local aspects of the setting (Fotopoulos & Psomas, 2010; Psychogios, 2010). There is a need to understand and curb the negative elements affecting TQM applied to Southern African construction setting. The fundamentals of the economies in Southern African countries except South Africa reflect high interest rates, high inflation, unstable exchange rates, high taxation and low levels of exports (DTIS, 2002; Randall, 2013). This state of economies shows a very difficult economic environment for implementation of TQM in construction. Therefore strategies have to be realised which would help construction companies adopt TQM in such an environment.

RESEARCH QUESTIONS

The following are the research questions developed for this paper which are as a result of the literature review above. They are designed to address the empirical gap regarding the TQM implementation barriers as applied to the Southern African construction setting and identify factors applying to such an environment.

Q1: What are the factors that constitute TQM implementation barriers?

Q2: How do the various TQM implementation barriers apply to the construction industry in Southern African setting?

Q3: What strategies and measures organisations should take to overcome the various TQM implementation barriers in construction?

This research paper aims at enhancing the understanding of TQM applied to a difficult setting by exploring various factors that describe TQM implementation barriers in construction. The data collection was guided by the three characteristics of TQM barriers in construction and the European Foundation for Quality Management (EFQM) model. The

EQFM model comprises of quality improvement enablers and results. The enablers consist of CSF such as leadership, people management, policy and strategy, resources and processes. The results comprise people, customer results, results on society and key performance results. The EFQM model is perceived as a TQM model (Bou-Llugar, et al., 2009). Adapting the EFQM model enables firms to outperform their counterparts (Santos - Vijande and Alvarez - Gonzalez, 2007). The EFQM model is seen as a route for obtaining competitive advantage by inspiring and supporting the application of TQM ideologies in organisations.

A study by Gomez-Lopez et al. (2015) on TQM implementation barriers using EFQM model revealed that TQM implementation is influenced by internal reasons, external reasons of requirements and external market reasons. Data collection scope was confined to those areas as stipulated by the EFQM model and emphasis was put on barriers on enablers and results and innovation and learning. Emphasis was put on EFQM because the model was repeatedly revisited incorporating developments and it also was well defined and criteria was well identified. The EFQM model has similar characteristics to the South African Business Excellence Framework in that the South African model also exhibits enablers and results as and continuous improvement as adopted by EFQM model (Williams, 2008).

Table 1 below presents the various organisational areas of interest that guide this research study and help explore the various TQM implementation factors applying to construction in the Southern African setting.

Table 2: Areas of Concern influencing TQM implementation barriers in this study (Source: Authors)	
ORGANISATIONAL	TQM BARRIER
Top management commitment	Measurement
Leadership	Resources
Quality assurance	Employee empowerment
Strategic planning	Communication
Improvement	Training
Structure	Individual behaviour
EXTERNAL STAKEHOLDER	
Suppliers	Customers
Subcontractors	Client representatives
WORKING ENVIRONMENT	
Business environment	Government systems
Global Occurences	Culture
Local factors	Industry

RESEARCH METHODOLOGY AND DESIGN

Study Organisations

In this study, organisations were selected based on: organisation engaged in construction work, be willing to participate in this study and share information and have some knowledge of quality management principles and practices. The purpose is to have an inclusive response set which help generalise the findings to represent the epic observed phenomena. Six major contractors were selected for this study because they exhibit TQM tendencies within their organisations and have some knowledge of quality management principles compared to those in lower categories. The participants were willing to share their TQM experiences. The participants were largely project managers, site engineers and directors of these companies. These personnel played significant TQM roles in their respective organisations. All interviews took place with the permission of the interviewees and the recordings were also consented by the interviewees as well. Five of the organisations have construction practices in Malawi, Mozambique and Zambia. One is an acclaimed international company present in at least 3 continents of the world. The remaining respondent organisation as well as one of the five are a conglomerate of construction and consulting firms. Studying these organisations aids in the richness of data and generalisation of findings since they have activities in other countries within Southern Africa. Details of study organisations are as shown in the table below.

Organisation	Activity	Remarks
Case A	Involved in road, building, rail construction and other civil works	Unlimited category in civil engineering construction, have worked worldwide
Case B	Involved in road, building, rail construction and other civil works	Unlimited category in civil engineering construction, involved in Malawi, Zambia and Mozambique
Case C	Involved in road, building, rail construction and other civil works	Unlimited category in civil engineering construction, involved in Malawi, Mozambique and Zambia. Also involved in consultancy work
Case D	Involved in road, building construction and other civil works	Unlimited category in civil engineering construction, involved in Zambia, Malawi and Mozambique.
Case E	Involved in road, building, construction and other civil works	Malawi Kwacha 200 million category, registered in Malawi, also involved in consultancy works.

Case F	Involved in road, building construction and other civil works	Unlimited category in civil engineering construction, involved in Zambia, Malawi and Mozambique
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Data collection

During this study, data was collected using semi-structured interviews. The questionnaire was developed from the literature review stage. The semi-structured interview method was preferred because it helped in achieving the objective of exploring various barriers affecting TQM implementation in construction in Southern Africa. The semi-structured interview can address more specific issues and are more cost effective than the other modes of interviews (Zikmund et al., 2010). The questionnaire allowed respondents to express themselves effectively and expound on their sentiments while maintaining a loose structure which allowed ease of analysis. Various organisational documents such as contract documents, accounting papers, test results, reports and organisational structure papers were visited by the authors so as to triangulate the information gathered.

Data analysis

The grounded theory analysis technique is the approach used in qualitative analysis which discovered theories, concepts and hypotheses directly from data (Westbrook, 1994). The grounded theory analysis emphasises on development of theory from an in-depth understanding of human behaviour and actions. It is the approach that was used in qualitative data analysis for this study. Data collected was reviewed and checked to rid of any unclear and inadequate output. All data collected including that after interviews was recorded thoroughly. The data was coded for accuracy and analysed using concepts that emerged. In grounded theory data analysis method, the following are the main types of coding (Westbrook, 1994; Kandadi, 2006; Strauss & Corbin, 1998) 1) **Open Coding:** This is the primary unrestricted coding done to check fit within particular data. Strauss & Corbin (1998) stated that during open coding, data was disintegrated examined and checked for similarities and conflicts. Concepts are identified by placing conceptual names suggestive of the context in which an occurrence was placed. Similar concepts are grouped together to form categories. Categories are a grouping of concepts representing important ideas that came out of the data (phenomena). A category represents an issue, a problem, an event, or any happening that is significant to the study. After the categories were conceptualised and generated, the properties and dimensions for the categories emerged. Properties stand for characteristics and attributes of a category while dimensions are the location of a property along a range. Memos representing the analysis record of thoughts, interpretations, inquiry and positioning of the researcher were employed for this study. These were useful for analysis, identification of categories and sub categories. Sub categories emerged from the categories which helped provide further information and clarification on phenomena. Emerging categories were identified through constant comparisons process whereby a new category was compared against previous occurrences and modified if there was non-conformance (Saunders et al., 2012). The TQM case similarities and differences provided the dimensions and properties for each category and sub category. 2) **Axial Coding:** This is done

towards the end stages of open coding when categories started to come out. This process is however not a sequential analytical step to open coding although it required that some categories be formed for it to take place but the axial coding process began during open coding. Categories and sub categories are related to the data based on properties, context, consequences and dimensions. Strauss & Corbin (1998) described axial coding as the process of linking the categories to their subordinate categories whereby the word axial described the process of coding around the axis category. Axial coding reconstructed the data that was disintegrated during the open coding process. Strauss & Corbin (1998) described the axial coding process as involving the following basic tasks: describing the properties and dimensions of a category, outlining the conditions, actions/interactions and consequences of a category, linking a category to its subcategory using statements that show how they relate to one another and discovering how major categories would relate to one another. Statements that link the categories to the sub categories are called relational statements or hypotheses. A category became saturated when no additional information (properties, dimensions, conditions, actions/interactions or consequences) emerged during coding (Strauss & Corbin, 1998). In this study, the axial coding identified the conditions, properties, dimensions and consequences of TQM barrier factors and categories. 3) **Selective Coding:** At this stage, core categories emerged from the data. The categories from open and axial coding are integrated and refined to form larger categories based on the story lines. Strauss & Corbin (1998) described the selective coding process as involving integration of data by forming core categories. Core categories explain what the research is all about. The core category should relate to all main categories. Its concept must appear frequently in the data and be able to explain contradiction or alternative cases. Integration could be achieved by employing techniques such as writing the storyline, using diagrams and manual or computer aided sorting. When writing the storyline the authors grasped the abstract concepts and related the central idea to other concepts. The core categories developed in selective coding phase formed the TQM barriers influencing practice. 4) **Coding for Process:** Coding for process refer to actions/interactions occurring over time in response to a context or situation. It is the manner in which people or individuals position themselves to react to a scenario, in an orderly manner, interrupted, progressively, harmonised or even haphazardly. The coding for process was part of the analysis and happened concurrently with the other coding functions. The coding for process analysed variations in the way actions/ interactions vary over time. The process appeared as strategies, tactics and responses reacting to action/ interactions (Strauss & Corbin, 1998). In this study categories are also referred to as factors. The process provides the foundations for theory building and TQM factor and barrier identification. The following criteria were adopted during analysis to support the findings.

- a. Each factor should be mentioned by at least two respondents in the study.
- b. The data supporting each factor should be appropriate for triangulation with other sources of information.
- c. Interviewees should be able to provide illustrations of how a particular barrier influenced TQM implementation and how it could be managed.

Ethics

Bryman (2004) suggests a number of ethical considerations to be looked at when conducting a study including protecting the privacy and confidentiality of research

participants and organisations, securing the consent of the participants and maintaining the accuracy of the data. This study followed these measures to ensure that ethical issues are properly considered.

FINDINGS AND DISCUSSION

The major findings from this qualitative study revealed a focus on the following themes of barriers affecting TQM implementation in Southern African construction organisations: **motivation; infrastructure and penchants and tendencies**

Motivation

From the qualitative study data collection and data analysis, motivation emerged as a core category of barriers that impede on TQM implementation in Southern African construction organisations. A number of concepts were reflected under this core category including lack of quality support, undefined TQM roles and responsibilities and award to lowest bidder. For quality support, a number of respondents mentioned a general lack of support from leaders on TQM issues as a barriers to TQM implementation in studied organisations. This lack of support emanates from leaders, be it top management, middle management or small group leaders. The traits highlighted include one-man show attitudes, poor employee encouragement for quality, lack of quality incentives, ignoring important construction site issues, lack of consistency between strategy and practice, poor provision of required resources and not championing change. The respondents view quality support as a vital element in TQM implementation in construction companies and managing it could improve the quality dexterity to the organisations. Quality support affects quality due to the dependency of followers on leaders to provide necessary resources, psychological and physiological provisions. Quality support is itself influenced by availability of resources and willingness among management to focus on quality other than other triple constraint factors such as time and cost. Among the solutions to the issue of provision of quality support is top management being role models to employees so as to encourage them to pursue the quality path. Talib and Rahman (2015) highlight that among the major barriers to TQM implementation are managerial issues and top management commitment. This view is also shared by Psychogios, (2010), Harrington et al., (2012) and Haupt and Whiteman, (2004). However its applicability to the Southern African context is expounded by respondents and the elements affecting this factor are equally highlighted in this study. The study revealed that quality support is a responsibility of middle managers as well as small group leaders apart from top management to ensure TQM implementation success within the organisation. The respondents also mentioned that quality support can also be bottom up whereby top management also need quality support of lower managers for effective TQM implementation since these lower managers lead the construction sites which are geographically far away from the head office. Lack of quality support at all levels impedes TQM implementation.

The majority of respondents viewed undefined TQM roles and responsibilities as a noteworthy barrier to TQM implementation. The undefined TQM roles and responsibilities

especially for middle to lower leaders and workers are due to lack of appointment of a quality manager, poor organisational structures and mechanistic structures. One study organisation respondent claimed that their boss is a know-it-all who wants to make every decision. This entails that this organisation has poor organisational and mechanistic structure. The respondent complained about delays in decision making process since all major decisions have to be made by the top man. He further complained about tarnished organisational image due to the same actions. The appointment of a specific quality manager was another issue that was lacking in the majority of respondent organisations. Most claimed that the functions of quality manager were being performed by particular individuals. A closer look at the named individuals showed that these personnel were simply improvised to undertake those functions and they simply did not appoint a quality manager and had undefined TQM roles and responsibilities. This conduct of improvisation rids the organisations of a robust TQM system which is coordinated by the quality manager.

Within the construction industry in Southern Africa, procurement predispositions that focus on price alone are prevalent. Some respondents alluded to this occurrence and bemoan the practice claiming that it rids the users of a quality focussed product and it leaves every player with sour grapes. Respondents said that if one needs to win contracts one should concentrate on bidding as low as possible. Some reflected that this would most likely result in lose-lose situations whereby the client loses on the product and the contractor loses on reputation even on profit.

Table 4: Motivation (Source: Authors)

CONCEPTS	FACTORS	CORE CATEGORIES
One-man show attitudes, poor employee encouragement for quality, lack of quality incentives, ignoring important construction site issues, lack of consistency between strategy and practice, poor provision of required resources, not championing change.	Lack of quality support	Motivation
lack of appointment of a quality manager, poor organisational structures, mechanistic structures, improvised roles	Undefined roles and responsibilities	
Low bid preference, dangerous work providers preferred due to price, no previous quality	Award of lowest bidder	

performance consideration		
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Most respondents said that procurement that emphasises on cost other than quality suppresses quality initiatives because people stress on cost alone. Other interviewees further said that there is a trend whereby the so called poor quality providers are continually being awarded with contracts because the client only focusses on their low prices but not on “dangerous” work that they produce. In relation to the above mentioned malpractice, the respondents said that consideration of previous quality experience and quality assessments in contract awards should be taken into account. It is known that quality comes at a cost and therefore clients have to be able to award works at the optimum price whereby quality output is also taken into the picture.

Motivation of stakeholders to implement TQM remains a virtue of top management so as to pursue competitive advantage and improve organisational performance. Table 4 highlights the core category of motivation.

Infrastructure

Infrastructure in this context refers to the activities and systems that support or impede TQM implementation in the organisation. These system and happenings are supposed to be part of the foundations of TQM initiatives hence the name infrastructure. This core category describes the TQM setting associated with a difficult environment since some of the factors are the norm in the developed world while in a difficult environment they have to be considered distinctly. Factors associated with infrastructure include poor TQM knowledge and TQM awareness, temporary workers, poor data collection and measurement and poor business environment.

A good number of respondents pointed out that there is a general lack of TQM knowledge and awareness among practitioners in the construction industry in the Southern African context. This barrier emanates from poor adoption of TQM officially, lack of written strategies, lack of experience and competencies, and illiteracy of workers. This barrier is also reflected among suppliers, subcontractors and other stakeholders. The significant effect of availability of quality employees to successful TQM implementation is mentioned in many studies in literature such as Demirbag et al. (2006); Harrington et al., (2012); Fotopoulus and Psomas (2010) however the context of this study reflect a general lack of such. All respondents say that employees and subcontractors should be engaged in a long term arrangement, educated, trained and motivated so as to produce quality output. However a majority of respondents said that most workers are trained on-the-job and training opportunities were far apart and in some cases non-existent. This means that the on-the-job trainers are themselves inadequately trained thereby adding to the problem of poor TQM knowledge and awareness.

The construction industry is awash with temporary workers. The majority of respondents recognise this as a significant barrier to TQM implementation in their respective organisations. Temporary workers are engaged in almost all construction projects. Some respondents say that the temporary workers need to be supervised closely and monitored for quality. Sometimes they form the majority of work personnel. The respondents say that temporary workers are usually untrained in their respective tasks during engagement. This is as a result of very short employment periods, poor retention of workers and nature of construction. This impacts on quality provision because it lessens the number of trained staff in the organisation. People working at organisations on temporary basis have issues to do with job insecurity and low employee morale, and they are pessimistic about their organisation and expect less trust and support in future employment (Fonner and Rolof, 2006). However there is two firms which said that they depend on these temporary workers a lot because their jobs are infrequent and cannot retain workers for long. Also once a temporary worker disappoints, he is fired there and then. This affects consistency of output compared to if the workers were permanent and trained. The said respondents later admitted that dependence on temporary workers is more costly in the long run due to avoidable reworks, and poor quality output. On another note other respondents said that they are trained, educated and retained as employees even staying without work for up to two years. They seem to be content and eager to work at this organisation although they do not have work to do all the time. This demonstrates that long term employee arrangements and adequate training are good qualities for TQM implementation within the organisation compared to if they were engaged on a temporary basis. Martinez-Sanchez et al. (2009) stress on the relationship between labour flexibility due to use of temporary workers and performance. They say that companies have to be careful if they are trying to use flexibility capabilities for innovation: "on the other hand, some flexible managerial practices should be adopted as early as possible"... so as to avoid the risks associated with the practice. Although use of temporary workers is seen here as a means for flexibility techniques, in this study temporary workers are considered as alternatives to normal workers due to economic reasons a thing that applies to the study setting.

Most study organisations perform few data collection measures other than those stipulated in the contract specifications. They do not do other measurements outside the contract requirements. Statistical control measures such as Pareto charts and cause and effect analysis are missing in most organisations and so is just in time measurements. Kannan and Tan (2005) reiterated that TQM and just in time measurements have consistent significant correlations which help improve the supply chain management of projects and products. The study showed that measurement of production processes is vital for TQM implementation in order to keep up with the levels of production. It is also necessary where improvements need to be done. Initial measures would indicate current levels and interventions would take place in trying to improve the process. After the intervention, measurements afterwards would indicate the impact of the intervention hence enable management make informed decisions about processes. Most study organisations did not perform market share measurements thereby missing out on vital market share information. Most organisations in this study do not measure customer satisfaction at all

and depend on unorthodox methods to gauge whether the client is satisfied or not. Since TQM principles stress on the need to make fact based decisions, this tendency rids the organisations of the opportunity to have the right facts on customer satisfaction which would enable them make informed decisions. Customer satisfaction needs to be measured using a simplified systematic measurement system so as to achieve consistency in outcomes. The success of the organisation is dependent on its ability to retain clients which is itself dependent on customer satisfaction. Measurement of customer satisfaction levels helps the organisation realise the areas that need improvement and which areas require reinforcement. Employee satisfaction and performance are two issues that have been researched on extensively over time. Their relationships with one influencing the other and vice versa have been the major subject. However the issue at hand here is their measurement. Most studied organisations lacked a majority of employee satisfaction and performance measurements. The study organisations realise that for the manager to be able to gauge the levels of satisfaction and performance there is need to perform the various measures of satisfaction and performance. Measures like employee annual assessment and time analysis would provide the manager with valuable insight into levels of satisfaction and performance. On financial measurement, most studied organisations concentrated on profit and loss measurements which are also part of contract document requirements. However, the construction industry is one which yearns for high levels of investment. The companies spend huge sums of money just to purchase one piece of equipment. So assets that the company acquires have to benefit the company at the end of the day. Measurements such as return on assets and return on investment give an indication of whether the assets and investments acquired are producing the desired profits for the company or not. So it is necessary for construction firms to do these financial performance measures.

Table 5: Infrastructure (Source: Authors)

CONCEPTS	FACTORS	CORE CATEGORIES
Poor adoption of TQM officially, lack of written strategies, lack of experience and competencies, illiteracy of workers, on the job training	Poor TQM knowledge and TQM awareness	Infrastructure
Very short employment periods, poor retention of workers, nature of construction, infrequent job opportunities, job insecurity	Temporary workers	
Unorthodox gauging methods, lack of statistical control measures, lack of customer satisfaction measures, poor	Poor data collection and measurement	

employee satisfaction and performance measurement, insufficient financial performance measurement		
Unstable exchange rates, high interest rates, high taxation, erratic payments for contracts, poor technology adoption, dwindling natural resources, political interference	Difficult business environment	

Respondents in this study have said that there is a difficult business environment in the study setting characterised by unstable exchange rates, high interest rates, high taxation, erratic payments for contracts, poor technology adoption, dwindling natural resources such as natural gravel and many other aspects acting on the environment. Given this poor state of the economy and other adverse environmental factors, TQM has to be implemented within this environment. Despite the difficulties, TQM has to suffice and organisations have to cope with these barriers. Respondents have suggested ways of adapting to the situation such as hedging, alternative funding measures, sticking to specifications, seeking alternatives where possible, training and awareness campaigns. Political interference happens always. This was mentioned by most respondents. It impacts on the scope of works to be covered. This has an effect on quality because quality is defined by scope and is affected if time and cost are affected in the triple constraint. Politicians would come onto a contract and start dictating on extra works which were not budgeted or planned for. Respondents also mentioned of interference in award of contracts in addition to the scope. All these have a bearing on the quality deliverance of the project. Unplanned works could interfere with the smooth running of the contract. Respondents have suggested sticking to specifications and consulting the client for way ahead when faced with political interference.

Penchants and Tendencies

Penchants and tendencies are the habits that hinder TQM implementations in construction organisations. A number of factors are associated with this core category including poor information sharing, overdependence on contract document and corruption.

Poor information sharing of TQM values, strategies, and statutes to and from all stakeholders, has been cited as a significant barrier among studied organisations. Information sharing with employees, clients and their representatives, suppliers, subcontractors, project beneficiaries, government representatives, top management and all other stakeholders on TQM should be enhanced among all players in the organisation's endeavours. Respondents highlighted lack of established channels of communication, poor response to issues, lack of journals, newsletters, memos for sharing of ideas. Among the most common tools for information sharing are meetings, memos and internet based forums. The study area has a serious lack of appropriate investment in internet technology.

Of the limited investment present, it comes at a huge price. So poor technology stood out as among the major contributors to the barrier of lack of effective information sharing. Respondents in majority mentioned overdependence on contract document as a major barrier to TQM implementation in construction. Although the contract document plays a significant role in quality procedures but it does not encompass everything to do with TQM. The contract document is said to be representing client needs during the contract execution. So organisations need to pay a lot of attention to the requirements stipulated by the client. If the contract document, comprising the designs, contract data, requirements, expectations, bill of quantities, general and particular specifications and references, contains obvious errors, then this puts the players in a compromised situation. Specification enforcement inadequacy by those assigned to enforce such as the supervisor, consultant or even the client on his own also pose a threat to quality delivery. Some respondents allude to the presence of this phenomenon in the studied organisations. Respondents say that such errors occur due to inexperience and lack of capacity by some supervisors, consultants and clients. This affects TQM initiatives since proper specifications are lacking or are being bypassed in contract decision making processes. Some respondents suggest that teamwork, consultations with the project team, offering alternatives, design and specification reviews, focus on a wider perspective which includes employees, suppliers, and other stakeholders, and proper record keeping, would help alleviate the problem. The respondents further recommended that TQM principles be adopted whereby a holistic approach to quality is emphasized other than relying on the contract document and specifications alone.

Table 6: Penchants and tendencies (Source: Authors)

CONCEPTS	FACTORS	CORE CATEGORIES
lack of established channels of communication, poor response to issues, lack of journals, newsletters, memos, lack of appropriate investment in internet technology	Poor information sharing	Penchants and Tendencies
Inadequate reinforcement, inexperience, lack of capacity of supervisors, consultants and clients, specifications lacking in contract document	Overdependence on contract document	
Interference in procurement processes, elimination of necessary checks and balances, favouritism, siphoning of money from projects,	Corruption	

collusion		
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All respondents said that corruption is rampant in the construction industry in Southern Africa. It tends to affect quality delivery whereby people tend to cut corners on checks and balances because they have assurances from someone influential. One respondent said that corruption also consumes money meant for work taken into people's pockets. The bad effects of corruption cannot be over emphasized. Some respondents said that the corruption evil is difficult to fight against. Wagabi (2013) agrees with this observation by saying that "corruption may never be eliminated totally but more can be done to limit its reach". Further investigation shows that the study organisations have done little to prepare themselves against this barrier. Their strategy papers do not contain specific actions and plans to counter corruption nor is there evidence of ways how they tackle it. Some respondents were even reluctant to open up on corruption. This shows that this evil practice happens in some sort of silence making it difficult to counter and fight against. One respondent said that their organisation is unpopular and does not get jobs often because they do not tolerate corruption at all. This entails that corruption is a double faced sword which can be induced by either party and for it to happen two parties have to collude. The respondents say that corruption can be dealt with if individuals are willing to fight it from within by rejecting it outright. Other proposed methods include controls against corruption such as adherence to specifications, law enforcement on corruption, empowerment of professionals to tackle corruption and good political leadership which resists and fights corruption. Unless these measures are encouraged and enforced, corruption remains a significant barrier to TQM implementation in construction firms in Southern Africa.

CONCLUSION

When adopting TQM in organisations, managers and leaders should have in mind the bigger picture about what works and what does not work during TQM implementantation. This understanding would help leaders explore TQM, identify key issues impacting TQM and effectively apply TQM. Most attempts to adapt the quality management approaches fail because they were adopted with little comprehension of why they exist and with few attempts to understand which particular culture or setting they would work. Many participants have been sceptical about quality because it had been brought into firms without careful consideration and had often failed to be adopted as a core philosophy.

This study has presented and explored some of the major barriers affecting TQM implementation in construction in Southern Africa. Empirical studies on six construction companies helped identify three core categories and ten TQM implementation barriers in construction. The core categories are motivation, infrastructure and penchants and tendencies. The factors associated with the core categories include lack of quality support, poor TQM knowledge and TQM awareness, poor information sharing, temporary workers, overdependence on contract document, poor data collection measurement, undefined TQM roles and responsibilities, award to lowest bidder tendency, poor business environment and

corruption. Numerous concepts were also identified which helped define the factors and core categories.

This study has managed to confirm the existence of some factors affecting TQM in least developed countries from literature such as low knowledge and communication issues (Tey and Ooi, 2004; McCollough and Benson, 1993; Magd, 2008) and preference of low bid prices (Haupt and Whiteman, 2004; Ankrah et al., 2009; Ngowi, 2000). However the study has managed to highlight and explain the links and associations to TQM in construction aligned to these barriers. It has further augmented the core categories which are rarely mentioned as being associated with TQM barriers such as infrastructure, penchants and tendencies and motivation in a distinct grounded analysis as shown above. The suggested strategies to deal with the mentioned barriers are unique to the study environment. TQM cannot be wholly adopted from one environment to another without taking into consideration the local effects and setting.

The practical implication of this study to leaders and managers of construction companies within Southern African countries is to enhance TQM implementation in their respective organisations and find effective ways of overcoming the barriers. There is a degree of variance in extent of barriers from organisation to organisation. This study helps the practitioners to comprehend the fundamental grounds and consequences of the barriers of TQM implementation in road construction and suggests effective strategies to overcome those barriers considering the unique features of their environment and culture. The proportions highlighted in this study therefore help building up the TQM implementation knowledge.

The outcomes of this study have the likelihood for constructive social change at a number of levels: individually, at organisation level and at societal level. At individual level, the outcomes may inform practitioners such as quality managers, top management and other technocrats on the impending challenges expected during TQM implementation in construction. At organisation level, the outcomes have the potential to improve practice by helping the organisation realise competitive advantage and improved profits through use of effective strategies to overcome the TQM barriers. At society level, the findings of this study indicate societal problems such as corruption and business environment which require wide level approaches to deal with these barriers. In addition, if TQM applied in road construction projects, the quality of the roads will be improved, this in turn will have direct impact on quality of life in the society, better roads means easier access to hospitals, schools and public places, better transport and movements of goods and services, etc. It can also save money for the country in long run and economic benefits to the society.

TQM cannot be exported wholly from another region to a new setting without taking into consideration the local factors associated with that setting. No study has been conducted considering difficult environment. Therefore, the outcome of this study, developed core categories and factors, are the basis for further research in TQM implementation and overcoming barriers in construction industry by considering the unique characteristics of

their environment. It can also inform TQM practitioners on the impending challenges expected during TQM implementation and improve practice by helping the organisation gain competitive advantage and profitability through use of effective strategies to overcome the TQM barriers.

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