

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND
TECHNOLOGY, KUMASI, GHANA**

**THE IMPACT OF TOTAL QUALITY MANAGEMENT (TQM) ON
COMPLETED SMALL TOWNS WATER SUPPLY SYSTEMS IN THE VOLTA
REGION**

By

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A Dissertation submitted to the Department of Construction Technology and
Management

College of Art and Built Environment

in partial fulfilment of the requirements for the degree of

MASTER OF SCIENCE

NOVEMBER, 2018

DECLARATION

I hereby declare that this submission is my own work towards the MSc and that, to the best of my knowledge, it contains no material previously published by another person, nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ACKNOWLEDGEMENT

The first thanks goes to the Almighty God for giving me life and strength to carry out this research. My sincere and profound gratitude goes to my supervisor, Prof. Ayarkwa for his irreplaceable research guidance, suggestions, and encouragement throughout the research process. Lastly, my sincere thanks go to all who in various ways have helped to make my research work complete especially all respondents. May the almighty God richly bless you all.

DEDICATION

I dedicate this work to all my family members for their support and prayers throughout
the programme

ABSTRACT

The aim of this study was to explore the impacts of total quality management (TQM) on the management of completed small towns water supply systems in the Volta Region. Data were gathered from a total of 53 officials of the CWSA and community water supply technicians through a questionnaire survey. The data was analyzed with descriptive statistics using frequencies and a Relative Importance Index (RII). Analysis of the data revealed that TQM has been impactful especially in the areas of system management through regular recording of project breakdowns, ensuring availability of trained personnel to carry out repairs and regular monitoring of project functionality to enhance customer satisfaction. The research showed that there are significant factors that affect the implementation of TQM with the main ones being that “Management has a clear vision for implementing quality goals”, “Top-level managers set clear quality goals” and “Management creates quality awareness among employees”. Overall, the analysis of the challenges of TQM implementation in the small towns water supply systems has revealed that there are significant challenges including poor communication, lack of statistical quality control techniques, absence of long Term planning, inadequate project funds and the lack of customer focus. The study concludes that the support and commitment that management takes in implementing a total quality environment is critical to the success of TQM implementation. Based on the findings of the study, the research recommends the development of an effective total quality management system with positive hands on leadership and management support.

Keywords: CWSA, TQM, Water Supply, Volta Region

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

Generally, access to potable water and safe sanitation is a pre-requisite for sustained human development. This view has significantly been recognized and expressed by the international community. For instance, the International Water Association (IWA), explicitly point out that “access to good, safe and reliable drinking water is one of the most basic needs of human society and as such requires integrated approach, close cooperation and partnership between all stakeholders” (IWA. 2004).

In the year 2000, the World Health Organisation (WHO) estimated that Africa contains 28% of the world’s population without access to improved water supplies, and 13% of the world’s population without access to improved sanitation (WHO, 2000).

In Ghana, in order to increase access to potable water to many communities, there is a small towns water supply system within some selected regions in the country. The aim was to contribute towards better living and health conditions for rural populations in Ghana. This was to be achieved through the provision of reliable and easily accessible sources of drinking water and a reduction in water and excreta- related diseases through the adoption of hygienic practices and improved sanitary installations (Community Water and Sanitation Agency, 2010).

It is noteworthy that the small towns water supply system should be managed holistically and most importantly be of service to people at all times. As noted by Baumann (2005), an estimated 35% of all rural water supplies in sub-Saharan Africa are not functioning

implying that sustainability of such water projects remains elusive. However, one such model for the management and sustainability of completed small towns water supply systems in Ghana is Total Quality Management (TQM).

TQM is a management philosophy which focuses on the work process and people, with the major concern for satisfying customers and improving the organizational performance and productivity. According to McAdam and Kelly (2002), TQM is a quality management system which pursues excellence in customer satisfaction through continuous improvements of products and process by the total involvement and dedication of everyone involved in the process or the products. This implies that TQM emphasizes on totality of implementing of quality in all facets of an organization.

1.2 STATEMENT OF THE PROBLEM

Although much prominence is given to the issue of potable water supply interventions, many developing countries experience significant problems of sustainability. This is especially true for many countries in sub-Saharan Africa with Ghana being no exception. Access to potable water has been a major problem for many small communities within the Volta Region over the years. It is therefore not surprising that the Volta Region is one of the regions to benefit from the implementation of the small towns water supply system.

Efforts must be directed towards both ensuring that water supply systems are in place and also most importantly that these systems are of service to people at all times. It is a truism that in developing countries, a significant number of projects, including those in the water and sanitation sector, fail to deliver benefits to society over the longer term. Carter and Danert (2005) note that this failure partly lies in the limited understanding of issues relating to impact and sustainability of such projects. Sustainability in this case relates to the

sustainable water supply that maintains a flow of benefits for a long period after the project has been left in the care of beneficiaries.

Although TQM is widely acclaimed by many organizations, its implementation in most cases has been a problem for many projects particularly in the Ghanaian utility sector. Over the years, Ghana is no exception as far as achievement of acceptable levels of TQM which is concerned especially with potable water supply. The problem of TQM implementation abounds and includes failure to communicate the direction of TQM in the organization as well as inadequate training. It is in the light of this that this study was undertaken to explore the impacts of TQM on completed small towns water supply systems in the Volta Region.

1.3 RESEARCH QUESTIONS

This study was guided by the following research questions:

1. What are the impacts of TQM in the management of completed small towns water supply systems?
2. What factors influence TQM implementation of completed small towns water supply systems?
3. What challenges are associated with the implementation of TQM to the completed small towns water supply systems.

1.4 RESEARCH AIM AND OBJECTIVES

1.4.1 Aim

The aim of this study was to explore the impacts of total quality management (TQM) on the management of completed small towns water supply systems in the Volta Region.

1.4.2 Objectives

For the purpose of addressing the research aim, the following specific objectives are set:

1. To identify the impacts of TQM on small towns water supply systems.
2. To identify significant factors that affect TQM implementation in the small towns water supply systems.
3. Identify the challenges associated with implementation of TQM in the small towns water supply systems.

1.5 SCOPE OF THE RESEARCH

This research was geographically limited to the Volta Region of Ghana. The study involved all the communities of the small towns water supply systems in the region controlled by the Community Water and Sanitation Agency (CWSA). The choice of the Volta Region was based on the significance of the operations of the small towns water supply systems to potable water supply within catchment communities. In addition, there have been significant issues relating to the non-sustainability of these projects after they have been left in the care of beneficiary communities in the region. Since total quality management is an organization wide endeavour, the contextual scope of the research therefore focuses on both officials of the Community Water and Sanitation Agency (CWSA) and the Community Water System Management Staff who are responsible for managing the water supply systems in the various communities within the Volta Region on the implementation of total quality management as a means of ensuring that the small towns water supply systems sustainably maintains their flow of benefits to the beneficiary communities for the required design .

1.6 METHODOLOGY

This study follows an exploratory research design. A total sample size of 72 workers of the Volta Regional CWSA (comprising technical and administrative staff members) and the Community Water System Management Staff (comprising system managers, technicians, revenue officers and relation officers) that work on various aspects of the small towns water supply systems within the Volta Region were selected through random and non-random sampling methods to form the respondents for the study. A detailed questionnaire consisting of closed-ended and Likert-type questions was developed based on the research objectives and distributed to the various respondents for primary data collection. The primary data assisted the researcher in obtaining first-hand information on the key issues of the topic under study. Also, a critical review of literature relating to the study was performed to provide secondary information and give an insight into the study. Frequencies and percentages as well as relative importance indexes were developed to process most of the data obtained through the questionnaire survey. The results of the analysis will be discussed in the form of comprehensive statements and analytical descriptions based on the primary data as well as the secondary information. Microsoft Excel and the Statistical Package for Social Sciences (SPSS) software was used for the analysis of data.

1.7 SIGNIFICANCE OF THE STUDY

The research would provide a detailed exposure to the practical realities of the situations and issues surrounding potable water supply and management at the local level in Ghana. In this regard, the researcher foresees that this study would go a long way to ensure the efficient and effective management of the small towns water supply systems to ensure its sustainability and continual benefit to society. As several practices emerge for carrying out

the sustainable management of projects, the need to have knowledge of them and their probable effect on management success also becomes increasingly important. The study also seeks to add to the inventory of knowledge on the management of water supply systems in the Ghanaian utility industry. This can serve as an educative material that will also provide a reference to students and all allied persons in academia.

1.8 ORGANISATION OF THE STUDY

This research report was structured in five chapters. Chapter one provides a general introduction to the study, stating the problems, outlining the research objectives as well as the scope of the research. Chapter two contains the literature review on total quality management and the sustainability of small towns water supply systems based primarily on the objectives of this study. It provides a discussion of the works of related studies on the topic under study. Chapter three provides details of the methodology used for the study. It will provide information on the research tools and techniques. The design of the research, the sources of the relevant data, methods of sampling and data collection techniques were also discussed in this chapter. Chapter four contains the analyses and discussions of the data obtained. The data were discussed and the results of the responses analyzed in this chapter. The conclusions and recommendations are contained in chapter five. Figure 1.1 shows the diagrammatic representation of the structural workflow for this research.

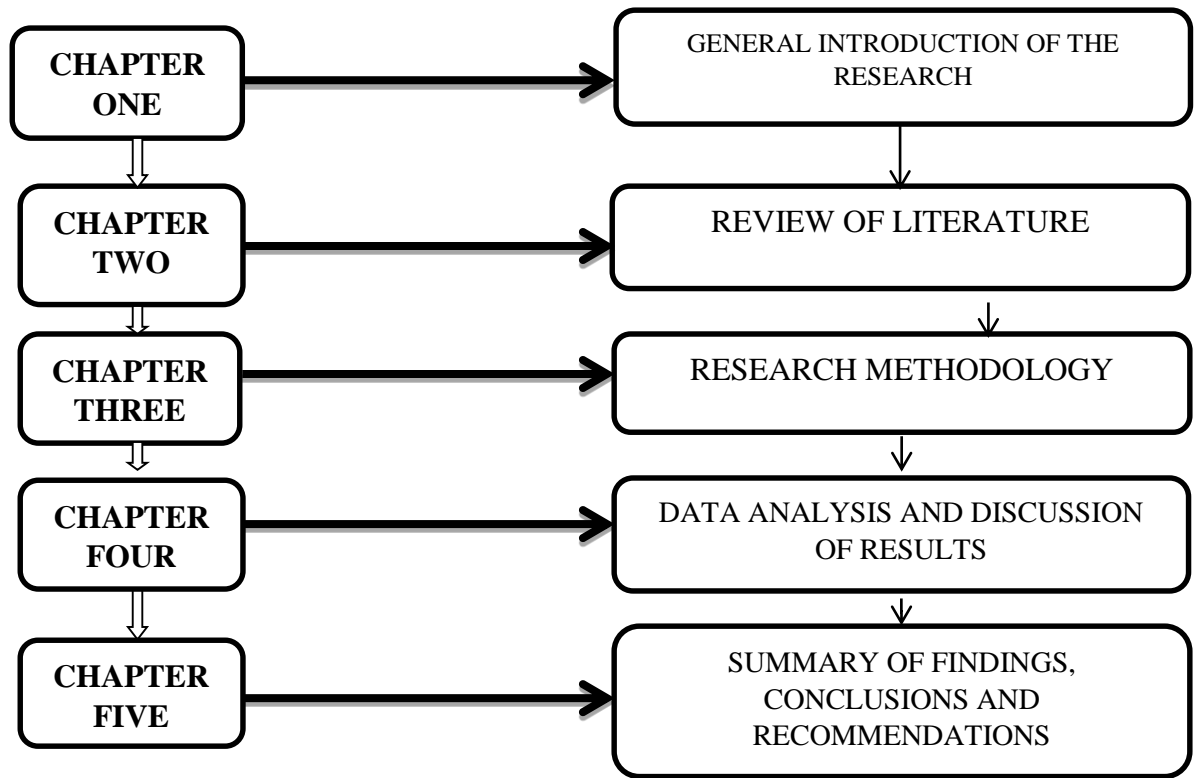


Figure 1.1: Summary of Research Organisation

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

In chapter one the general introduction of the research was discussed focusing on the background to the research, statement of the problem, research aim and objectives, overview of methodology, justification and the significance of the research. In this chapter, literature relating to total quality management and sustainability of projects are reviewed. This chapter dwells on secondary materials from research articles and other relevant publications related to the conceptual issues relevant to this study. The chapter starts with the concept of total quality management (TQM). This is then followed by a review of the factors that influence TQM; benefits of TQM; and the challenges associated with TQM implementation..

2.2 THE CONCEPT OF TOTAL QUALITY MANAGEMENT (TQM)

The term Total Quality Management (TQM) does not lend itself to a universally accepted definition. In view of this, Zhang (2000) observes that researchers have adopted varying definitions and frameworks of TQM and its implementation based on their own objectives and understanding.

According to Zhang (2000), TQM is a management philosophy for continuously improving overall business performance based on certain key factors such as leadership, supplier quality management, vision and plan statement, evaluation, process control and improvement, product design, quality system improvement, employee participation, recognition and reward, education and training, and customer focus. Similarly, Dahlgaard

et al. (2002) sees TQM as a corporate culture characterised by increased customer satisfaction through continuous improvement, in which all employees in the firm actively participate. Dale (2003) rightfully observes that there are many interpretations and definitions of TQM. However, he simply explains TQM to be a mutual cooperation of everyone in an organisation and associated business processes to produce value-for-money products and services to meet and hopefully exceed the needs and expectations of customers (Dale, 2003).

From the various definitions and viewpoints of Total Quality Management, it can be viewed as an effective approach to providing higher quality services and products through focusing management and control processes on an entire organization and all of the employees in providing products or services that satisfy the customers. TQM is different from traditional management as its philosophy seeks to integrate all organizational functions while focusing on meeting customer needs, employees' satisfaction and organizational objectives. In this regard, Total Quality embraces not only the quality of a specific product or service, but rather everything an organisation does.

TQM is a never ending continuous improvement process. TQM is an organisation wide approach focusing on managing quality through collective effort, commitment of every member of the Organisation and even goes beyond the organisation by recognising the contributions made by suppliers and customers, and establishing formal and close working links and relations with them (Zhang, 2000; Dahlgaard et al., 2002). Put more simply and emphatically, Janpen et al. (2005), sees TQM as a continuous set of mindset that keeps on improvement processes for individuals, groups and whole organizations by understanding and discovering better process.

2.3 COMPONENTS OF TOTAL QUALITY MANAGEMENT (TQM)

Emphatically, TQM can be envisaged as a management system for a customer-focused organization that involves all employees in continual improvement. As noted by Love et al. (2000), TQM embraces principles, processes, practices and procedures necessary for providing customer satisfaction and achieving improvement in productivity and business performance. In this regard, TQM uses strategy, data, and effective communications to integrate the quality discipline into the culture and activities of the organization. The components of TQM are discussed as follows:

2.3.1 Systems and Techniques

Identification of the relevant tools and techniques pertinent to quality management within an organisation at different stages is required. This includes the area/project and the conditions in which the tools should be used to achieve successful application.

2.3.2 People

The people component of TQM is very vital as TQM is an organisation-wide endeavour. The people component entails both people as customers and people as employees. Regarding people as customers, they ultimately determines the level of quality.. Furthermore, regarding people as employees, it is imperative that management keep employees in the picture at all times when decisions are being made regarding TQM

2.3.3 Culture

Organisational culture forms an integral component of TQM. This is because TQM needs to be aligned with human resource systems, including job design, selection processes, compensation and rewards, performance appraisal, and training and development. TQM

has been noted to result in a radical change in the culture and the way of work in an organization (Hyde, 1992). A fundamental factor is leadership, including philosophy, style, and behaviour.

2.3.4 Communications

Communication is a vital component of total quality management. Effective communication plays an active role in enhancing and maintaining employee morale and motivation at all times. Typically, during times of change and also as part of daily organisation activities, effective communication is needed.

2.4 SUCCESS FACTORS THAT INFLUENCE TOTAL QUALITY MANAGEMENT (TQM)

From the review of the concept of TQM, a major tenet that becomes apparent is that TQM is a continuous improvement process. In this regard, TQM should be at the core of an organisation and employed every working day, to achieve the best quality attainable. Through an extensive review of literature, certain clear factors for the implementation of TQM based on the core components of TQM becomes apparent and are discussed in this current study as follows:

2.4.1 Top Management Commitment and Leadership

The role of top management and leadership in the TQM endeavor cannot be over emphasized. This has been explicitly argued by Oakland (2003), in his assertion that in order to be successful in promoting business efficiency and effectiveness, TQM must start at the top with the chief executive. Researches by Salem et al. (2005) and Hudson (2007) has shown that the top management of every organization has a major role to play in

achieving a successful implementation of innovative strategies. These viewpoints indicate that TQM can be made possible with the involvement or commitment of management to the organisation's strategy of continuous improvement, open communication and cooperation through the organisation.

2.4.2 Cultural Change

The need for cultural change is stressed by the role it plays in the life of an organisation. Tang et al (2005) described the collective attitudes and a belief of employees towards quality as the quality culture of the organisation. According to them, good quality culture is the platform on which quality management system is built. Culture influences what the executive groups attend to, how it interprets information and the response it makes to changes in the external environments.

According to Dale (2003), cultural change implies an approach to changing the cooperate culture of an organisation to be customer centered. Quality culture is so critical that Cortada and Woods (1995) concluded that the absence of it makes quality management so mechanical and therefore fails to achieve the customer satisfaction so desired. According to Oakland (1995), TQM is a way of managing the whole business process to ensure complete customer satisfaction at every stage, both internally and externally. Studies by Ramachandran (2010) and Mahmood and Mohammed (2008) conclude that the implementation of TQM requires a culture change and change in management behaviour.

2.4.3 Customer Focus

Most organisations know throughout its ranks that the purpose for all efforts at work is to please the customer better. In this regard, the key factor to ensure Customer satisfaction is

in knowing, understanding and meeting the clear and realistic objectives of the customer. TQM is an ideology which is focused on the satisfaction of customer's need. Thus, most organisations try as much as possible to meet or exceed customer's expectations in their daily activity and also their long term plan (Andrle, 1994).

Filippini and Forza (1998), explained that is necessary for organisations to maintain a close link with their customers in order to know their requirements and to measure how it has been successful in meeting up to customer's requirements. Moreover, Xiao and Proverbs (2003) discuss that measuring customer satisfaction can benefit companies in ways such as: improvement of communication between parties, recognition of the necessity of process improvement, better understanding of problems, evaluation of progress towards the goal, and monitoring and reporting accomplished results.

2.4.4 Total Involvement

According to Dale and Cooper (1993), TQM approach involves achieving broad employee interest, participation and contribution in the process of quality management. Employees are therefore encouraged to perform functions such as information processing, problem solving and decision making (Dimitriades, 2000). This is supported by Omachonu and Ross (1994), who noted that intrinsic motivation is at the heart of TQM, where empowerment and involvement in decision making is viewed as essential for sustained result.

2.4.5 Continuous Improvement

Generally, continuous improvement is the relentless pursuit of improvement in the delivery of value to customers. Fuentes-Fuentes et al. (2011) defined continuous improvement as a

commitment to constant examination of the technical and administrative process in the search of better methods. Similarly, Stahl (1995) noted that continuous improvement refers to the constant refinement and improvement of products, services and organisational system to yield improved value to customers.

2.4.6 Effective Employee Training

Effective training leads to a continuous improvement of the work processes and improves the mental capacities and skills of staff. Employee training is the basic practice that organizations provide to improve specific skills in their employees to boost the organizational performance, quality, and customer satisfaction and then reduce time and costs. According to Hassin et al. (2007), training and education are key factors in the implementation of TQM.

Training helps in preparing employees towards managing the TQM ideology in the process of production. Arditi and Gunaydin (1997) note that employee training and education in TQM theory and practice for all employees are essential to enhance competitiveness. Training equips people with the necessary skills and techniques of quality improvement. It is argued to be a powerful building block of business in the achievement of its aims and objectives (Stahl, 1995). Through training, employees are able to identify improvement opportunities as it is directed at providing necessary skills and knowledge for all employees to be able to contribute to ongoing quality improvement process of production.

Investment made in employee training and development, efficient communication mechanisms, flexible work environment and safety make a significant contribution to continuous improvement aspect of international project management (CIIPM) (Jung and

Yong, 2006). Stahl (1995), argued that training and development program should not be seen as a onetime event but a lifelong process.

2.4.7 Working in Teams

Dale (2003), noted that team work aids the commitment of the workforce to the organisational goals and objectives. The researchers believe that it is essential to have a team made up of people with right attitudinal disposition to working in groups so as to realise the gains of quality management. Martinez et al. (1998), noted that teamwork contributes to the generation of improvements that are proposed by employees. According to them, the proposed improvements have a way of changing the attitudes of employees that are resistant to change.

2.5 BENEFITS OF TQM

Overall, there marked benefits of TQM implementation with success stories in many industries including manufacturing and construction. For instance, Oswald and Burati (1992) observed that TQM has resulted in improved customer satisfaction, reduced cycle times, documented cost savings, and more satisfied and productive work forces in the construction industry.

Studies by Low and Teo (2004), Khan (2003), Chindo and Adogbo (2011) reveal the following benefits of the application of quality management programs:

- Enables companies to improve long-term relationships, product and process improvement
- Create a harmonious team spirit
- More customer focused

- Employee job satisfaction
- Increased revenues
- Reduction in quality costs
- Decreasing waste and rework
- Better coordination of activities
- Improved customer service and market competitiveness
- Enhance professionalism and skills
- Encourage open addressing of problems
- Help to achieve the intended project objectives and benefits.

Tang et al. (2005), outlines individual organisation level benefits of TQM to include the following:

- Better service to customers
- Reduced project duration and costs
- Better utilization of the talents of its people

2.6 CHALLENGES ASSOCIATED WITH IMPLEMENTATION OF TQM

Although TQM has been widely accepted in many industries, it is noteworthy that no firm can fully implement TQM as it is a continuous improvement process and as such never ending. Despite the marked benefits of TQM, there are identifiable obstacles and challenges to its implementation in many firms.

As TQM is an organisation wide approach focusing on managing quality through the collective effort and commitment of every stakeholder to an organisation, the challenges of TQM thus encompasses individual, management, financial, technical, educational and

government related factors. With regard to individual related factors, there have been a growing scholarly interest in examining the willingness of employees to contribute both in developmental activities (Noe and Wilkinson, 1994) and in processes of systemic level change and transformation. Typical challenges to TQM implementation at the individual level relate to the scope of expertise in TQM that an employee possesses (Pasmore and Fagans, 1992); the degree of individual empowerment experienced by an employee in the work setting (Sashkin and Kiser 1993); the level of employee motivation to apply TQ tools to ongoing tasks (Waldman, 1994) and employee fulfilment (Anderson et al., 1994)

With regard to management issues in TQM implementation, the success of quality management practice lies in the commitment of top management in developing and implementing an actual plan and adequately providing the required resources and support to manage changes arising from the implementation. However, challenges identified in several studies seem to be related to management issues. Notable management challenges in literature include: delay in decision making, lack of top management support and commitment, lack of time for innovation, unsuitable organizational structure, weak administration, lack of supply chain integration, poor communication, use of substandard components, lack of steady work engagement, long implementation period, inadequate preplanning, poor procurement selection strategies, poor planning, inadequate resources, lack of client and supplier involvement, lack of customer focus and absence of long term planning (Alarcon et al., 2008; Olatunji, 2008). Thus overcoming of these barriers is very critical to the implementation of quality management practice across organizations.

Finance and economic related issues are among the most common challenges to total quality management practice across different organizations. Adequate funding is needed to

motivate the workers, provide relevant equipment's and employ specialist to guide both employers and employees in implementing the concept. It is noteworthy that the nature of financial and economic challenges to TQM implementation varies across countries. Typical financial and economic challenges to TQM implementation identified in literature include corruption, inadequate projects funding, inflation, implementation cost, and poor professional wages, lack of incentives and motivation, and risk aversion (Olatunji, 2008; Mossman, 2009). Unless adequate efforts are made to overcome these barriers, several companies could be discouraged from implementing quality management practice in their organizations.

2.7 COMMUNITY WATER SUPPLY INSTITUTIONS IN GHANA

The key bodies related to potable water supply in Ghana include ministries, departments, agencies and Institutions. Such bodies typically include: Ministry of Water Resources, Works and Housing (MWRWH), Ministry of Health (MoH), Community Water and Sanitation Agency (CWSA), National Development Planning Commission (NDPC), Regional Coordinating Councils (RCCs) and Municipal/District Assemblies (M/DAs), Ghana Standards Board (GSB), Environmental Protection Agency (EPA), Public Utility Regulatory Commission (PURC), Civil Society Organisations (CSOs) like international and local NGOs and the Private Sector (PS) including consultants, contractors and suppliers (GoG, 2007).

Typically, the Public Utilities Regulatory Commission (PURC) is the economic regulator of the urban water sector in Ghana, responsible for setting water rates, establishing regulatory guidelines and protecting the interests of consumers (Nyarko et al., 2004).

From the above discussion, it becomes apparent that several groups play a role in partnerships in the water sector: the government at the local level; the formal private sector; and external support agencies. Households also have a role to play but are often left out (Tumusiime and Njiru, 2004). According to Hordijk (2000), the household is the key unit of production, reproduction and consumption, and the unit where decisions on pooling and allocating labour and resources are made (as cited in Sulemanova, 2002). Poor households spend considerable amounts of physical, economic and social energies to maintain access to potable water supply (George, 2005).

UNCHS (2001) reports that the public sector has its primary strength from its legal authority, law making power, monitoring and regulatory function, and the mandate that it has to act directly with (or delegate responsibility to) other stakeholders. However, political interference and corruption, high staff turnover and significant inefficient and inflexible bureaucracy are some weaknesses of the public sector (Shashi et al 2009).

Faulkner (1997) describes the formal private sector as institutions, firms and individuals who may be active in many different aspects of infrastructure management but whose main objective and organization is to generate a profit on their investments. The private sector has strengths in transparency, its ability to innovate and replicate and its customer focus (Caplan, 2001). It is able to respond quickly to the need to improve and deliver services and has limited exposure to political interference. Pessoa (2008), however notes that the involvement of the private sector in the water service delivery require strong economic regulation to protect the interests of the parties involved.

Huge capital investments in small towns' water supply systems require some form of from external agencies outside the locality. External agencies rarely stay for long and only

continue their local presence to guarantee the maintenance and expansion of new projects (UNCHS, 2001).

According to the CWSA (2010) report, the strategic objective of the operation and maintenance guidelines for small towns is to operate and maintain Small Towns Water Supply and Sanitation Systems in such a manner as to ensure sustainability through an effective overall administrative, technical and financial management of the systems by appointed water and sanitation development boards with the support of relevant public and private sector institutions. The following general principles shall guide small towns water supply operation and maintenance:

1. Small Towns Water Supply Systems shall be operated and maintained in a sustainable manner by meeting the following requirements:

- a. Delivering to consumers the design quantity of water.
- b. Producing water to Ghana Standards Board Water Quality Standards.
- c. Delivery of water in a cost effective manner (in accordance with tariff guidelines).
- d. Delivering water in a virtually uninterrupted manner (at least 95% of the time).
- e. Planned routine and periodic maintenance are carried out for all electro mechanical equipment and civil works structures.

2. Water Supply Systems shall be operated and maintained either directly by the community or through contractual arrangements with private companies.

3. All operational staff of private companies or community members engaged to operate and maintain the systems shall be provided with adequate training and shall be certified to perform their respective duties. Periodic refresher training shall be provided to such staff.
4. Adequate records shall be kept on the operation and maintenance of the water supply system for analysis, reporting and informed decision making (CWSA, 2010).

2.8 OVERVIEW OF WATER SUPPLY PROJECT SUSTAINABILITY

Generally, sustainability of a project entails the continual operation of the project to yield continuous benefits or value over a long term. In terms of a project, there need to be a broad, clear and well-defined concept of sustainability to guide implementation and serve as a basis for evaluation. According to WELL (1998), sustainability in rural water supply encompasses many aspects including institutional, social, technical, environmental and financial dimensions.

Sustainability of rural water supply and sanitation projects particularly in developing countries have been very problematic. For instance, It is estimated that 35% of all rural water supplies in sub-Saharan Africa are not functioning (Baumann, 2005). This is in spite of the frequency with which the term sustainability appears in development discourse implying the elusive nature of sustainability. Although sustainability of improvements in quality of life and valued benefits have generally been agreed to be the goal of development assistance, there continue to be many projects undertaken by both local and international development organizations which fail to sustain benefits. According to the Water and Sanitation for Health (WASH) Project, sustainability is the basic measure of success of both the national system for development and the community systems (WHO, 2000).

For the purpose of this current study, sustainability is defined to mean a sustainable water supply and sanitation project that maintains, or expands, a flow of benefits at a specified level for a long period after external funding has been withdrawn. Furthermore, in this current study, sustainability as applied to the small towns water supply system in Ghana can be viewed through three different dimensions as contained in the World Bank Report (2007). These dimensions are: sustainability of outcomes; sustainability of processes; and sustainability of resources.

In the case of sustainability of outcomes, an assessment of sustainability in this regard would measure the improvements in quality of life or standard of living of project beneficiaries made due to the project, then predict the durability of those gains in the years following the project.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter discusses the research methodology adopted for this study to achieve the research objectives. The chapter presents in-depth explanations of the research strategy, research design, types and sources of data, sampling methods, techniques of data collection and data management and analysis.

3.2 RESEARCH STRATEGY

Bryman (2004) identified research strategy as a general orientation to the conduct of research. This is usually influenced by the type of research question, the extent of control an investigator has and whether or not the focus is on contemporary or historical events, and to what extent (Yin, 2003). The three main research strategies, are quantitative, qualitative, and triangulation (Baiden, 2006). This research however adopted a quantitative strategy. Quantitative research according to Aliaga and Gunderson (2000), explains phenomenon by collecting numerical data that are analyzed using mathematically based method. So this specific form of research uses the quantitative data for analysis.

3.3 RESEARCH DESIGN

According to Ghauri and Grønhaug (2010) a research design is the overall plan for relating a conceptual research problem to relevant and practicable empirical research. This research is an exploratory study designed to explore the impact of total quality management (TQM) on completed small towns water supply systems in the Volta Region. Data were obtained mainly from primary sources in order to get first-hand information to address the aim of

the study. The research also relied on a cross-sectional approach in data collection where data was collected at a single point in time for the respondents with a questionnaire. The questionnaire offered a quantitative approach for analyzing the relationships among the various variables. Data were gathered from a representative sample and analyzed by using descriptive statistics.

3.4 TYPES AND SOURCES OF DATA

The study employed the use of both primary data and secondary information.

3.4.1 Primary Data

Primary data was largely used for this study. This enabled the researcher to get original information from the various respondents through the administration of questionnaires to the various respondents and personal observations. Primary data were sourced from officials of the Community Water and Sanitation Agency (CWSA) that work on various aspects of the small towns water supply systems within the Volta Region and the Community Water System Management Staff that operate in the individual communities. The data included background information as well as questions on the key components of TQM implementation; factors affecting TQM implementation as well as the challenges associated with implementation of TQM in the small towns water supply systems. .

3.4.2 Secondary Information

Secondary information provided the conceptual and theoretical basis for this current study on the impact of total quality management (TQM) on completed small towns water supply systems.

3.5 RESEARCH POPULATION

According to Twumasi (2001), research population is the universal set of all respondents or members that contain the characteristics of interest. This research focused on the completed water supply systems in the Volta Region as the unit of analysis. According to the Volta Regional Community Water and Sanitation Agency (CWSA), there are sixty (60) water supply systems in the various communities. Within each community, there are four workers (comprising systems manager, technicians, revenue collector and relation officer) on the water supply systems. In this regard, the population for the Community Water System Management staff was 240. In addition, there are 15 workers of the CWSA who make up the technical and administrative staff members from whom data would be collected. This brings the total population for the study to be 255.

3.6 SAMPLE SIZE DETERMINATION AND SAMPLING TECHNIQUES

3.6.1 Sample Size Determination

The sample size for the study was determined using the Kish (1965) formula as follows:

$$n = \frac{N}{1 + N(\alpha)^2}$$

where

α is the level of significance or margin of error (10% or 0.1)

n is the sample size and

N is the population (255)

$$n = \frac{255}{1 + 255(0.1)^2}$$

$$= 71.83$$

The calculated sample size was 71.83 which was rounded to 72 respondents

3.6.2 Sampling Techniques

This research used varied sampling techniques. In the first place, the water systems were selected using purposive sampling. Out of the 60 water supply systems, the largest 15 systems based on the CWSA records were selected.

With regard to the Community Water and Sanitation Agency (CWSA), the study used stratified sampling. This involved dividing the population into different strata based on their functions and randomly selecting samples from each strata. This was done to ensure uniformity in data collection and ensured a fair representation of all categories of workers. For the purpose of this study, the CWSA workers were grouped into two different strata comprising technical (such as engineers) and administrative members. This grouping was based on their different experience and functions in ensuring quality management. Within the administrative stratum, four (4) respondents were randomly selected and within the technical stratum, nine (9) respondents were randomly selected. This gave a sample size of thirteen (13) Community Water and Sanitation Agency (CWSA) respondents.

Within each of the 15 selected water supply systems, all four (4) workers of the system were selected as respondents giving a total of 60 respondents. The selection of the respondents was based on their availability and willingness to participate in the study. In

all, a total of 75 respondents were thus selected for the research. The breakdown of the respondents is presented in Table 3.1.

Table 3.1: Breakdown of Respondents

Sampling basis		Number of selected respondents
CWSA Strata	Technical officials	9
	Administrative officials	4
Community water supply system management staff		60
Total		72

Source: Author's Construct, 2018

3.7 DATA COLLECTION METHODS

Primary data was collected mainly by the use of questionnaire.

3.7.1 Questionnaire Design

A structured questionnaire was designed and administered to each respondent to obtain the required data pertaining to all issues of the topic outlined in the objectives of the study. The questionnaire was structured into separate sections based on the objectives of the study. The questionnaire consisted of closed-ended and Likert-type (using a five point Likert scale) questions. The closed-ended and Likert-type questions are used for their advantages of being quick to answer and requiring no writing by the respondent (Naoum, 2001). The various questions were obtained with the help of a detailed literature review. For ease of understanding, the questionnaires were phrased to be self-explanatory and structured to elicit the needed information.

3.7.2 Questionnaire Distribution

The validity of the data collected depends much on the structure and the format of questions addressed. The researcher personally administered the questionnaire to the various respondents. This was done to ensure that the questionnaire got to the right people. In order to ensure a high questionnaire, return rate, the researcher personally collected all the questionnaires once the respondents were done filling them.

3.8 DATA ANALYSIS METHODS

The data collected were analyzed using varied methods. Firstly, the analyses involved the use of descriptive statistics tools such as frequencies, percentages and means to summarize most of the data that were obtained through the surveys. Also, ranking indices were developed and used to rank the responses on the Likert-type questions provided by the respondents. The ranking indices were developed using a Relative Importance Index (RII) developed for each item of the Likert type questions. This was adopted because, Adnan et al (2006) asserted that to analyse data on ordinal scale (e.g. Likert scale 1-5), the application of Importance Index is also suitable.

The RII was calculated by multiplying the individual frequencies by their corresponding values of responses under each rating of 1-5 and dividing the sum by the product of the total number of respondents and 5 which is the highest figure on the five-point Likert scale.

$$RII = \frac{1y_1 + 2y_2 + 3y_3 + 4y_4 + 5y_5}{5n}$$

Where y_1, y_2, y_3, y_4 and y_5 are the corresponding number of respondents who choose factors under each rating of 1-5

n = the total number of respondents

The Statistical Package for Social Sciences (SPSS) software was used for analyzing and processing most of the data that was obtained through the surveys. This information was then discussed to arrive at the results and findings. The data analysis was in the form of comprehensive statements and analytical descriptions based on the primary data as well as the secondary information. Microsoft Excel was used to create visual presentations (bar graphs, pie charts and tables) to describe the relationships among of the variables.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the results of the analysis of the survey data collected. The results of this study have been discussed under thematic sub-sections in line with research objectives. The themes include; background information of respondents; impacts of TQM in the management of completed small towns water supply systems; factors that affect TQM implementation in the small towns water supply systems; and challenges associated with implementation of TQM in the small towns water supply systems.

4.2 QUESTIONNAIRE RESPONSE RATE

For the purpose of this research, questionnaires were distributed to a total of 72 respondents comprising Community Water and Sanitation Agency (CWSA) officials and community water systems Management Staff in the Volta Region. However, out of the 72 questionnaires, a total of 53 questionnaires that were completely filled by the respondents were used for the analysis accordingly. This represented a questionnaire response rate of 73.6% which was very high and appropriate for the study. As noted by Peil (1995), a questionnaire return rate of above 50% is acceptable for a study.

4.3 BACKGROUND INFORMATION OF RESPONDENTS

This section of the analysis provides the background information of the respondents that were involved in the questionnaire survey. The respondents' background covered various characteristics including their roles, educational qualification, years of working and their staff status.

With regard to their roles, the respondents had varied roles in relation to the water supply systems. Table 4.1 illustrates a summary of the roles of the various respondents.

Table 4.1: Role of Respondents

Role	Frequency	Percentage
Technician Engineer	18	34.0
System Manager	12	22.6
Revenue Officer	8	15.1
Community Relations Officer	6	11.3
Project Engineer	5	9.4
Hydrologist	4	7.5
Total	53	100.0

Source: Field survey, 2018

It is observed from Table 4.1 that majority of the respondents (34%) were System management staff. These management staff were responsible for the daily check and upkeep of the systems within the various communities. Also, 22.6% of the respondents were system managers of the water supply systems with another 15.1% of them being revenue officers in charge of the daily financial returns from the systems. Community relations officers comprised 11.3% of the respondents. Project engineers and hydrologists comprised 9.4% and 7.5% of the respondents respectively. Evidently, all these respondents in relation to their roles had active responsibilities of ensuring the smooth operations of the small towns water supply systems.

The educational levels of the respondents showed that the respondents have obtained relatively higher educational qualifications. The educational level of the respondents is shown in Figure 4.1.

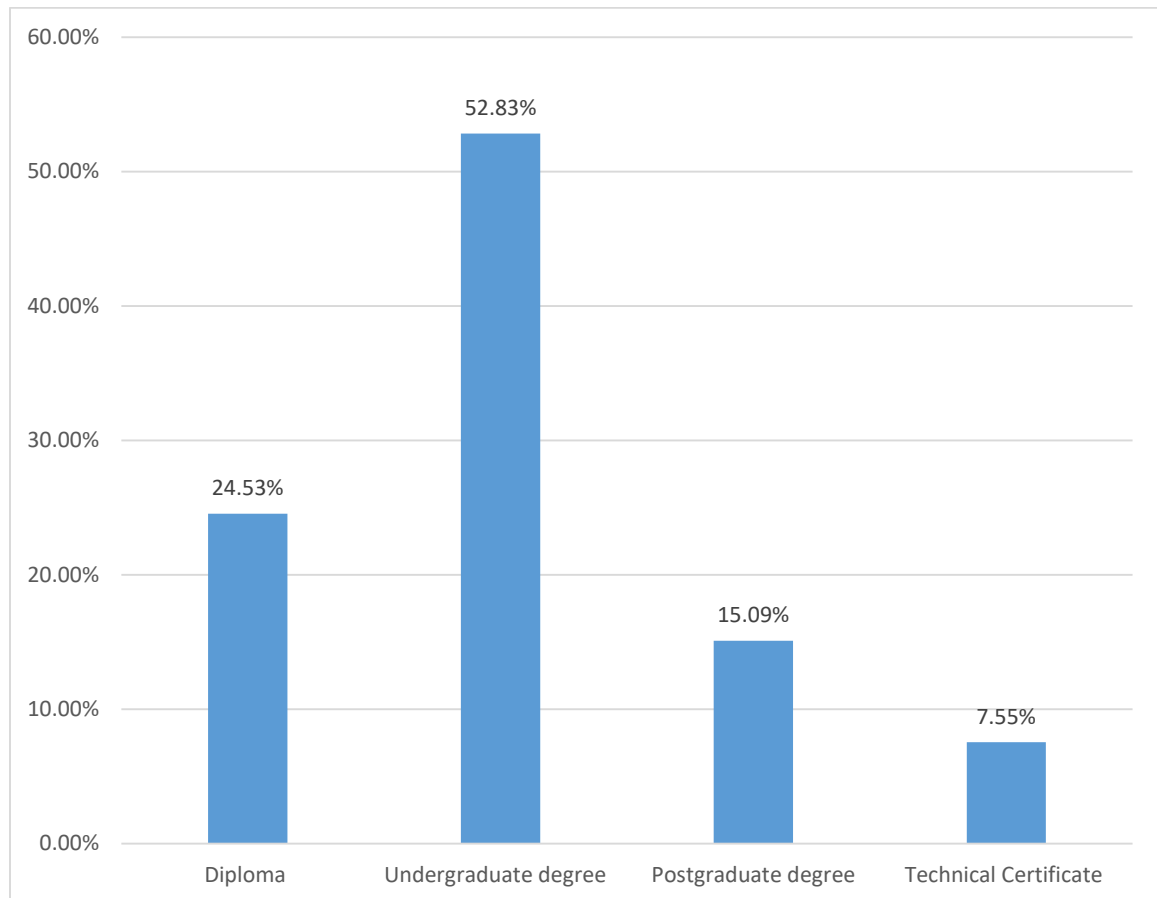


Figure 4.1: Highest Educational Level of Respondents

Source: Field survey, 2018

The majority of the respondents (52.8%) have obtained undergraduate degrees with another 24.5% of the respondents having obtained a Diploma. Also, 15.1% have obtained postgraduate degrees. The respondents who had obtained Technical Certificates comprised 7.6% of the respondents. This finding implies that the respondents were relatively highly

educated which could be due to the specialized roles they perform in ensuring the smooth operations of the water supply systems.

The results of the analysis further showed that the respondents' have worked on the water supply systems for periods ranging from less than 5 years to more than 20 years. This is illustrated in Figure 4.2.

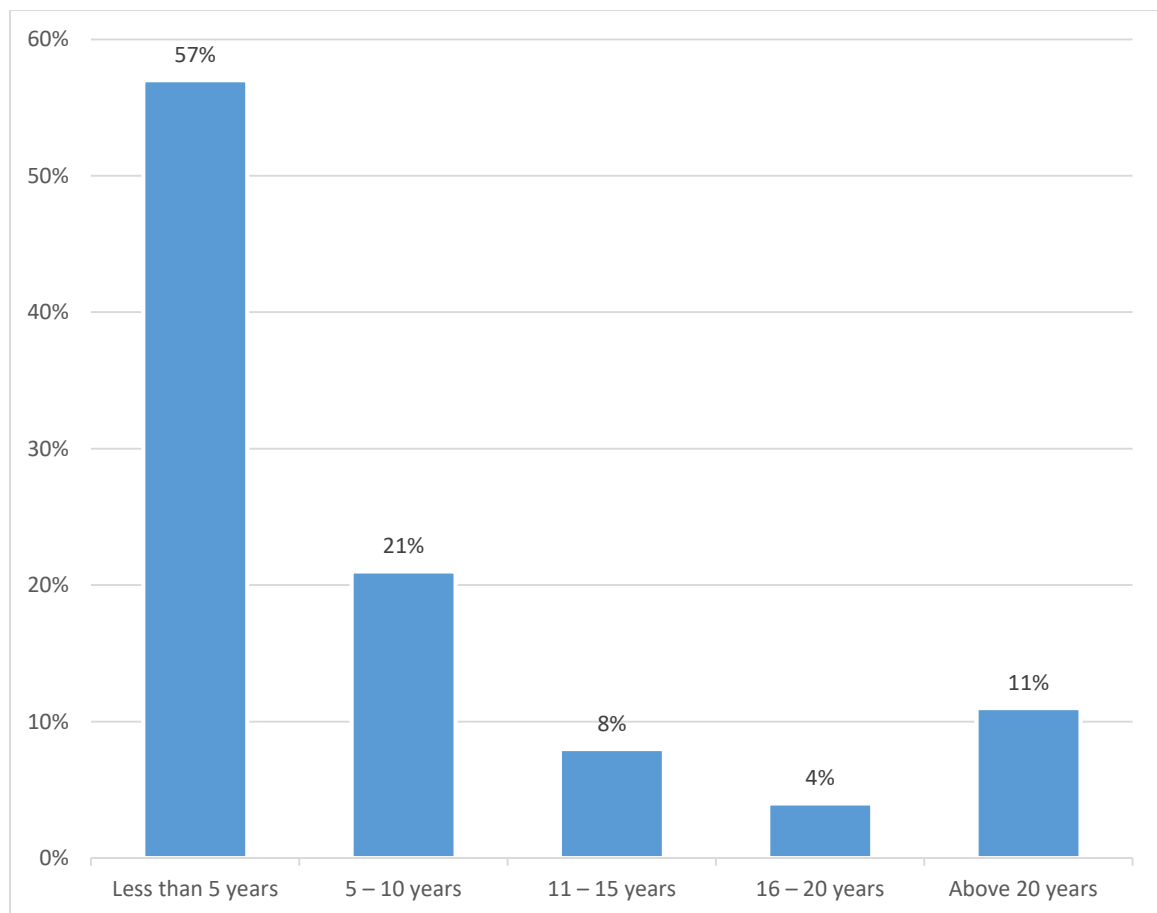


Figure 4.2: Respondents Period of Working

Source: Field survey, 2018

From Figure 4.2, it is noticeable that the majority of the respondents (57%) have been working on the water supply systems for a period less than 5 years. Also, 21% of the respondents have worked on the systems for 5 to 10 years. About 8% of the respondents

have worked for 11 to 15 years with another 4% working for 16 to 20 years. Eleven percent of the respondents have worked for more than 20 years. This finding implied that the respondents had varying work experience on the water supply systems.

With regard to their staff status, most of the respondents (70%) belonged to the junior staff category. Another 11% were senior staff members with the remaining 19% indicating that they were management members. This is illustrated in Figure 4.3.

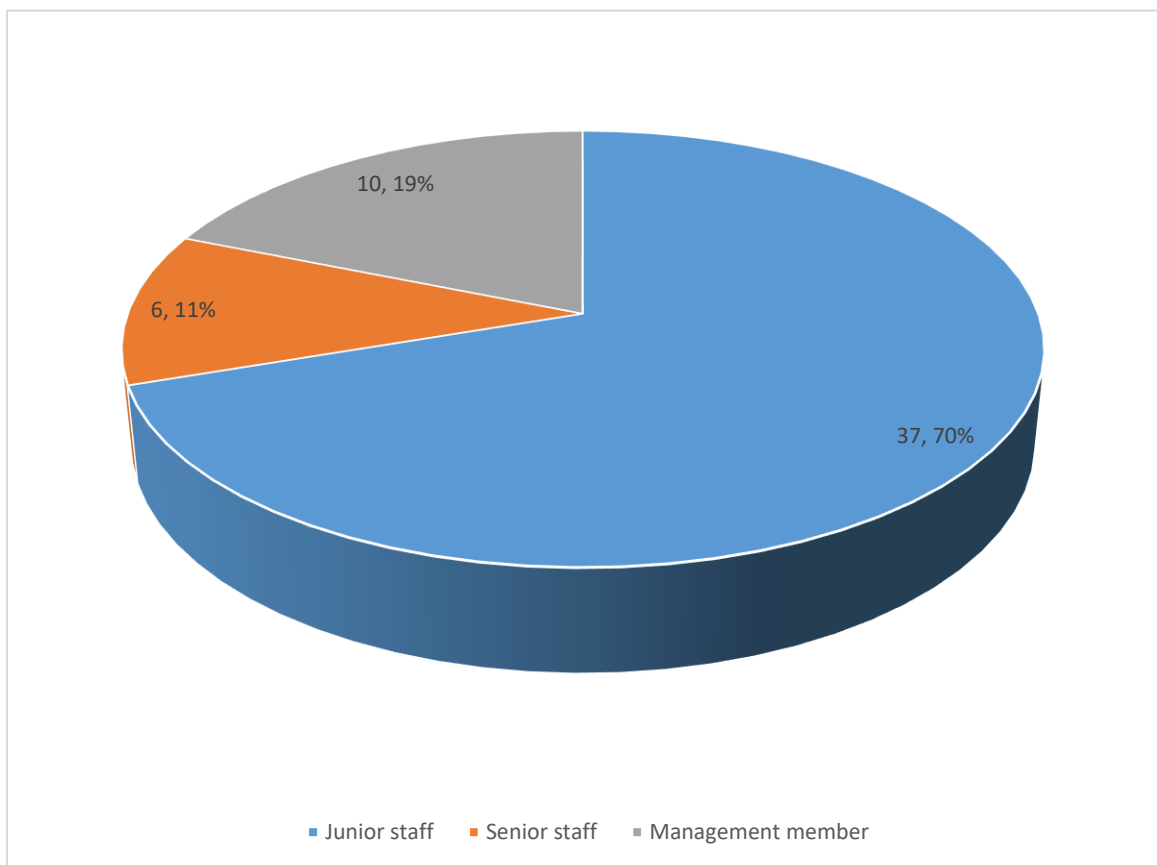


Figure 4.3: Staff Status of Respondents

Source: Field Survey, 2018

4.4 IMPACTS OF TQM IN THE MANAGEMENT OF COMPLETED SMALL TOWNS WATER SUPPLY SYSTEMS

In this section of the analysis, the impacts of TQM in the management of the completed small towns water supply systems are documented based on the responses of the respondents. In this regard, the respondents were asked to rate their extent of agreement on some specific statements as the impacts of TQM. The rating was done using a five-point Likert scale with 1 representing strongly disagree, through to 5 representing strongly agree. The data was analyzed using frequency distributions and then the impacts ranked using a Relative Importance Index (RII) developed for each statement. The RII values ranged from 0-1. This means that the higher the RII value; closer to 1, the stronger the agreement on that statement and consequently its significance. The result of the analysis is shown in Table 4.2.

Table 4.2: Respondents Rating of Impacts of TQM in Completed Water Supply Systems

Impacts	1	2	3	4	5	Total	Weighting	RII	Rank
TQM ensure there is a representative community organization that is trained to manage the projects to everyone's satisfaction	0	4	2	42	5	53	207	0.781	1 st
TQM ensure the regular recording of project breakdowns and down time	2	2	4	37	8	53	206	0.777	2 nd
Ensuring customer satisfaction	0	5	2	41	5	53	205	0.774	3 rd
TQM ensure availability of trained personnel to carry out major repairs when facility breaks down	4	2	4	33	10	53	202	0.762	4 th
TQM ensure regular monitoring of project functionality	0	7	6	37	3	53	195	0.736	5 th
Enhancing compliance with statutory, environment and safety requirement	0	7	24	19	3	53	177	0.668	6 th
TQM ensure an equitable tariff structure be put in place that is based on operation and	10	7	2	28	6	53	172	0.649	7 th
TQM provide support to community decision making and management	0	12	20	21	0	53	168	0.634	8 th
Increased project maintenance	0	25	10	13	5	53	157	0.592	9 th
TQM ensure support for technical issues that are beyond the capacity of communities to resolve	2	25	5	16	5	53	156	0.589	10 th
Increased project life span	2	32	2	12	5	53	145	0.547	11 th
TQM ensure availability and accessibility of spare parts for projects	2	33	4	11	3	53	139	0.525	12 th
TQM ensure supply chains for spare parts and other service providers operate in a supportive environment	3	32	2	15	1	53	138	0.521	13 th
TQM ensure ability of the beneficiary to carry out maintenance on the facilities	2	37	2	9	3	53	133	0.502	14 th

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

From Table 4.2, it is noticeable that the respondents were split in their responses to the impacts of TQM on completed small towns water supply systems. The individual RII values for the listed challenges ranged from 0.781 to 0.502. In terms of ranking, the statement that “TQM ensure there is a representative community organization that is trained to manage the projects to everyone’s satisfaction” was highly rated by the respondents with an RII of 0.781. This implied that majority of the respondents expressed agreement that the implementation of TQM has ensured that a representative community organization has been trained to manage the projects. The statement that “TQM ensure the regular recording of project breakdowns and down time” was ranked second with an RII of 0.777. The statements of “Ensuring customer satisfaction”, “TQM ensure availability of trained personnel to carry out major repairs when facility breaks down” and “TQM ensure regular monitoring of project functionality” were ranked third, fourth and fifth respectively with RII values of 0.774, 0.762 and 0.736. Evidently, all these statements were identified as significant impacts of TQM to the completed water supply systems. It is noticeable that for each of these statements, majority of the respondents expressed some form of agreement. These findings were not surprising and were consistent with the overall objectives of total quality management such as ensuring customer satisfaction.

It is also noticeable in Table 4.2 that the least ranked statements on the impacts of TQM were those that majority of the respondents expressed disagreement. These are reflected in the statements with low RII values of 0.592 and below. For instance, the statements of “Increased project maintenance”, “TQM ensure support for technical issues that are beyond the capacity of communities to resolve” and “Increased project life span” had RII values of 0.592, 0.589 and 0.547 respectively. This is indicative that most respondents generally

disagreed to these statements as impacts of TQM on the completed systems. Also, the statements that “TQM ensure availability and accessibility of spare parts for projects”, “TQM ensure supply chains for spare parts and other service providers operate in a supportive environment” and “TQM ensure ability of the beneficiary to carry out maintenance on the facilities” were the least rated by the respondents with RII values of 0.525, 0.521 and 0.502.

The overall analysis of the impacts of TQM on the completed systems reveal that TQM has been impactful especially in the areas of system management through regular recording of project breakdowns and down time, ensuring availability of trained personnel to carry out major repairs when facility breaks down and regular monitoring of project functionality to enhance customer satisfaction. These impacts relate to the marked benefits of TQM implementation with success stories in many industries including manufacturing and construction as identified by researchers such as Low and Teo (2004), Khan (2003), Chindo and Adogbo (2011).

4.4 FACTORS AFFECTING TQM IMPLEMENTATION IN THE COMPLETED SMALL TOWNS WATER SUPPLY SYSTEMS

In this section of the analysis, the factors that affect the implementation of TQM within the small towns water supply systems are identified. Generally, the factors that affect TQM implementation are categorized into management commitment, continuous improvement, customer focus, training, employee empowerment and process management. In this regard, the respondents were asked to rate their extent of agreement on some specific statements under the broad factor groupings using a five-point Likert scale with 1 representing strongly disagree, through to 5 representing strongly agree. The data was analyzed using

frequency distributions and then ranked using a Relative Importance Index (RII) developed for each statement. The RII values ranged from 0-1. This means that the higher the RII value; closer to 1, the stronger the agreement on that statement and consequently its significance. The results of the analysis are shown in the following Tables.

Table 4.3: Respondents Rating of Management Factors to TQM Implementation

MANAGEMENT COMMITMENT	1	2	3	4	5	Total	Weighting	RII	Rank
Management has a clear vision for implementing quality goals	2	8	6	32	5	53	189	0.713	1 st
Top-level managers set clear quality goals	5	4	8	32	4	53	185	0.698	2 nd
Management creates quality awareness among employees	0	11	19	23	0	53	171	0.645	3 rd
Management empowers all employees to have adequate knowledge in quality procedures	3	20	20	10	0	53	143	0.540	4 th
Management put emphasis on long-term plan to improve quality	18	17	7	6	5	53	122	0.460	5 th
Management periodically reviews policies and procedures to ensure that proper quality controls are in place	3	37	7	6	0	53	122	0.460	5 th

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

From Table 4.3, it is observed that the responses varied among the respondents on each statement. However, it is noticeable that the statements with the high RII values (0.645 and above) had more respondents expressing agreement while the statements with low RII values had more respondents expressing disagreement. The statement that “Management has a clear vision for implementing quality goals” had the highest RII value of 0.713. This was followed by the statements that “Top-level managers set clear quality goals” and “Management creates quality awareness among employees” with respective RII values of 0.698 and 0.645. This finding implies that these statements are significant management commitment factors that affect TQM implementation in the small towns and water supply system. However, the statements that “Management empowers all employees to have adequate knowledge in quality procedures”, “Management put emphasis on long-term plan to improve quality” and “Management periodically reviews policies and procedures to ensure that proper quality controls are in place” were generally disagreed by the respondents. This implies that these statements were not significant management related factors for the implementation of TQM in the small towns water supply systems. Overall, the importance of management commitment to TQM cannot be underestimated. This could be due to the critical role roles top management members play in ensuring TQM. This is consistent with findings from researches by Salem et al. (2005) and Hudson (2007) that the top management of every organization has a major role to play in achieving a successful implementation of innovative strategies. This explicitly indicate that TQM can be made possible with the involvement or commitment of management to the organisation’s strategy of continuous improvement, open communication and cooperation through the organisation.

Table 4.4: Respondents Rating of Continuous Improvement Factors to TQM Implementation

CONTINUOUS IMPROVEMENT	1	2	3	4	5	Total	Weighting	RII	Rank
The organisation encourages employees to be creative and innovative in improving processes	0	20	20	13	0	53	152	0.574	1 st
The organisation evaluates performance and take measures to improve on it	0	38	2	13	0	53	134	0.506	2 nd

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

From Table 4.4, it is noticeable that both the statements that “The organisation encourages employees to be creative and innovative in improving processes” and “The organisation evaluates performance and take measures to improve on it” were generally disagreed by the majority of the respondents. This implies that aspects of continuous improvement such as encouraging employees to be creative and innovative as well as performance evaluations of employees are not among the factors affecting TQM implementation within the small towns and water supply systems.

Table 4.5: Respondents Rating of Customer Focus to TQM Implementation

CUSTOMER FOCUS	1	2	3	4	5	Total	Weighting	RII	Rank
The organisation gives full attention to Client Needs	2	7	14	28	2	53	180	0.679	1 st
Community members are actively involved in decision making	4	26	2	18	3	53	149	0.562	2 nd
The organisation gives feedback forms to Client after delivery of projects	2	32	0	15	4	53	146	0.551	3 rd

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

In terms of customer focus, the statement that “The organisation gives full attention to Client Needs” had the highest RII of 0.679. This implies that giving full attention to clients’ needs is a key factor in TQM implementation. This is not very surprising as a key objective of TQM is customer satisfaction. As indicated by Andrie (1994), most organisations try as much as possible to meet or exceed customer’s expectations in their daily activity and also their long term plan. Interestingly, the statement that “The organisation gives feedback forms to Client after delivery of projects” was the least rated an RII value of 0.551. It therefore bares on the organisation to do more in terms of giving customer feedbacks. In line with Filippini and Forza (1998), assertion that is necessary for organisations to maintain a close link with their customers in order to know their requirements and to measure how it has been successful in meeting up to customer’s requirements.

Table 4.6: Respondents Rating of Training to TQM Implementation

TRAINING	1	2	3	4	5	Total	Weighting	RII	Rank
The organisation gives regular training to all employees on teamwork	4	29	5	14	1	53	138	0.521	1 st
The organisation gives regular training to all employees on the Processes for Improvement	2	36	3	10	2	53	133	0.502	2 nd
The organisation gives regular training to all employees on Client Satisfaction.	0	37	8	8	0	53	130	0.491	3 rd
Formal training in Quality Policy or TQM is given to employees	12	25	4	10	2	53	124	0.468	4 th
The organisation gives regular training on how to gather information concerning Client, Workforce and general	7	30	8	8	0	53	123	0.464	5 th

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

The responses on training indicates a general disagreement on the statements. All the statements had relatively low RII values indicating that majority of the respondents disagreed with the statements. This is surprising as training is a key factor for TQM

implementation as found in other researches such as Hassin et al. (2007) who conclude that training and education are key factors in the implementation of TQM.

Table 4.7: Respondents Rating of Employee Empowerment Factors to TQM Implementation

EMPLOYEE EMPOWERMENT	1	2	3	4	5	Total	Weighting	RII	Rank
People in the organisation have the knowledge, skill and tools to support them in their duties	0	5	5	41	2	53	199	0.751	1 st
The organisation encourages team work	0	10	10	28	5	53	187	0.706	2 nd
Good communication is encouraged to eliminate fear/withdrawal	2	29	12	10	0	53	136	0.513	4 th
Staff members are given the resources necessary to deal with customer complaints	6	29	3	15	0	53	133	0.502	5 th

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

In terms of employee empowerment, majority of the respondents generally expressed agreement to the statements that “People in the organisation have the knowledge, skill and tools to support them in their duties” and “The organisation encourages team work”. These statements had respective RII of 0.751 and 0.706. This implied these statements were significant factors for TQM implementation. On the other hand, majority of the

respondents generally disagreed to the statements that “Good communication is encouraged to eliminate fear/withdrawal” and “Staff members are given the resources necessary to deal with customer complaints”.

Table 4.8: Respondents Rating of Process Management Factors to TQM Implementation

PROCESS MANAGEMENT	1	2	3	4	5	Total	Weighting	RII	Rank
There is clear clarity of work processes and methods	5	10	4	32	2	53	175	0.660	1sr
Check sheets are available to monitor the adherence of scheduled processes	10	22	2	11	5	50	129	0.487	2nd

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=strongly agree

Source: Field survey, 2018

The statement that “There is clear clarity of work processes and methods” was highly rated with RII of 0.660. This implies that the clarity of work process and methods was a vital factor to TQM implementation. However, majority of the respondents generally expressed disagreement that “Check sheets are available to monitor the adherence of scheduled processes” implying that this factor was not significant in TQM implementation.

4.3 CHALLENGES ASSOCIATED WITH IMPLEMENTATION OF TQM IN THE SMALL TOWNS WATER SUPPLY SYSTEMS

Despite the marked benefits of TQM implementation, there exist some notable challenges relating to its implementation in the management of the small towns water supply systems. In order to find out the significant challenges in this respect, the respondents were asked to rate their extent of agreement on some statements as the challenges facing the implementation of TQM using a five-point Likert scale with 1 representing strongly disagree, through to 5 representing strongly agree. The data was analyzed using frequency distributions and the challenges ranked using a Relative Importance Index (RII) developed for each statement. The RII values ranged from 0-1. This means that the higher the RII value; closer to 1, the stronger the agreement on that statement. The result of the analysis is shown in Table 4.9.

Table 4.9: Respondents Rating of Challenges to TQM Implementation

Challenges	1	2	3	4	5	Total	Weighting	RII	Rank
Poor Communication	0	9	3	28	13	53	204	0.770	1 st
Lack of statistical quality control techniques	0	4	8	36	5	53	201	0.758	2 nd
Absence of Long Term Planning	0	8	3	35	7	53	200	0.755	3 rd
Inadequate project funds	0	9	6	27	11	53	199	0.751	4 th
Lack of Customer Focus	0	6	4	43	0	53	196	0.740	5 th
Lack of competence and education about quality management	0	8	7	34	4	53	193	0.728	6 th
Lack of standardized procedures	0	9	5	35	4	53	193	0.728	6 th
Lack of adequate resources to manage quality	0	11	0	42	0	53	190	0.717	8 th
Lack of detailed project planning	0	12	5	34	2	53	185	0.698	9 th
Excess Documentation required	0	7	14	32	0	53	184	0.694	10 th
Lack of quality data and limited access to data	0	13	6	30	4	53	184	0.694	10 th
Lack of practical experience in quality management	0	14	7	28	4	53	181	0.683	12 th
Lack of Teamwork	0	14	7	28	4	53	181	0.683	12 th
Lack of cooperation and commitment among project stakeholders	0	12	15	20	6	53	179	0.675	14 th
Lack of staff training	0	19	2	28	4	53	176	0.664	15 th
Lack of support and commitment from executive management	3	18	7	21	4	53	164	0.619	16 th
Lack of information and knowledge of quality management	7	25	5	16	0	53	136	0.513	18 th
Lack of client and supplier involvement	5	40	1	5	2	53	118	0.445	19 th
Unsuitable Organisational Structure	7	35	5	6	0	53	116	0.438	20 th
Lack of active community involvement	4	44	1	4	0	53	111	0.419	21 st

1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Source: Field Survey, 2018

From Table 4.9, it is noticeable that the respondents were split in their responses to the challenges of TQM implementation in the small towns water supply systems. The individual RII values for the listed challenges ranged from 0.770 to 0.419. This implies that most of the respondents were in agreement with some of the statements on the challenges while for some of the other statements, most of the respondents were in disagreement as challenges to TQM implementation. Evidently, “Poor Communication” had the highest RII value of 0.770 and ranked first. This implied a general agreement of the respondents that poor communication was a challenge to TQM implementation. This is explicitly observed in Table 4.8 where majority of the respondents agreed or strongly agreed.

Another significant challenge was the “Lack of statistical quality control techniques” with an RII value of 0.758 and ranked second. “Absence of Long Term Planning”, “Inadequate project funds” and “Lack of Customer Focus” were also significant challenges ranking third, fourth and fifth respectively with RII values of 0.755, 0.751 and 0.740. “Lack of competence and education about quality management” and “Lack of standardized procedures” were both ranked sixth by the respondents with an RII of 0.742. The statement that “Lack of adequate resources to manage quality” had an RII of 0.717 and ranked as the eighth challenge to TQM implementation. It becomes apparent that these challenges are highly significant in the TQM implementation of the small towns water supply systems considering their relatively high RII values (greater than 0.700). For instance, adequate funding is needed to motivate the workers, provide relevant equipment and employ specialist to guide both employers and employees in implementing TQM. These challenges

have also been identified as significant barriers in TQM implementation in the works of Common et al. (2000), Olatunji (2008) and Mossman (2009).

The statements of “Lack of information and knowledge of quality management”, “Lack of client and supplier involvement”, “Unsuitable Organisational Structure” and “Lack of active community involvement” were the least ranked challenges of TQM implementation at the small towns water supply systems with RII values of 0.513, 0.445, 0.438 and 0.419 respectively. It is noticeable from Table 4.8 that for these statements, majority of the respondents expressed some form of disagreement. This implies that these statements were not significant challenges to TQM implementation in the small towns and water supply systems. This indicates that there is a suitable organizational structure, client and supplier involvement as well as adequate information and knowledge of quality management.

Overall, the analysis of the challenges of TQM implementation in the small towns water supply systems has revealed that there are some significant challenges including poor communication, lack of statistical quality control techniques, absence of long Term planning, inadequate project funds and the lack of customer focus. However, some other general challenges to TQM implementation such as lack of client and supplier involvement, unsuitable Organisational Structure, and lack of active community involvement are not very significant in the case of the small towns water supply systems.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This chapter provides a summary of the findings of the research based on the previous chapters. The chapter also contains the conclusion to the research and suggests some recommendations based on the research findings.

5.2 SUMMARY OF FINDINGS

The aim of this study was to explore the implementation of total quality management (TQM) for small towns water supply systems in the Volta Region. A total of 72 questionnaires were distributed to CWSA officials and community water supply technicians. However, out of the retrieved questionnaires, 53 of them were completely filled and appropriately used for the analysis accordingly. This represented a response rate of 73.6%. The following subsections provide a summary of the findings based on thematic sub-sections in line with research objectives.

5.2.1 Impacts of TQM in the Management of Completed Small Towns Water Supply Systems

The statement that “TQM ensure there is a representative community organization that is trained to manage the projects to everyone’s satisfaction” was highly rated by the respondents with an RII of 0.781. The statement that “TQM ensure the regular recording of project breakdowns and down time” was ranked second with an RII of 0.777. The statements of “Ensuring customer satisfaction”, “TQM ensure availability of trained personnel to carry out major repairs when facility breaks down” and “TQM ensure regular

monitoring of project functionality” were ranked third, fourth and fifth respectively with RII values of 0.774, 0.762 and 0.736. Evidently, all these statements were identified as significant impacts of TQM to the completed water supply systems. Also, the statements that “TQM ensure availability and accessibility of spare parts for projects”, “TQM ensure supply chains for spare parts and other service providers operate in a supportive environment” and “TQM ensure ability of the beneficiary to carry out maintenance on the facilities” were the least rated by the respondents with RII values of 0.525, 0.521 and 0.502. The overall analysis of the impacts of TQM on the completed systems reveal that TQM has been impactful especially in the areas of system management through regular recording of project breakdowns and down time, ensuring availability of trained personnel to carry out major repairs when facility breaks down and regular monitoring of project functionality to enhance customer satisfaction.

5.2.1 Factors Affecting TQM Implementation in the Small Towns Water Supply Systems

Generally, the factors that affect TQM implementation are categorized into management commitment, continuous improvement, customer focus, training, employee empowerment and process management. In terms of management commitment, the statement that “Management has a clear vision for implementing quality goals” had RII value of 0.713 and “Top-level managers set clear quality goals” and “Management creates quality awareness among employees” with respective RII values of 0.698 and 0.645. From the analysis, aspects of continuous improvement such as encouraging employees to be creative and innovative as well as performance evaluations of employees are not among the factors affecting TQM implementation. In terms of customer focus, the statement that “The

organisation gives full attention to Client Needs” had the highest RII of 0.679. In terms of employee empowerment, majority of the respondents generally expressed agreement to the statements that “People in the organisation have the knowledge, skill and tools to support them in their duties” and “The organisation encourages team work”. These statements had respective RII of 0.751 and 0.706. The statement that “There is clear clarity of work processes and methods” was highly rated with RII of 0.660 implying that the clarity of work process and methods was a vital factor to TQM implementation.

5.2.2 Challenges Associated With Implementation of TQM in the Completed Small Towns Water Supply Systems

From the analysis, “Poor Communication” had the highest RII value of 0.770 implying a general agreement of the respondents that poor communication was a challenge to TQM implementation. Another significant challenge was the “Lack of statistical quality control techniques” with an RII value of 0.758. “Absence of Long Term Planning”, “Inadequate project funds” and “Lack of Customer Focus” were also significant challenges respectively with RII values of 0.755, 0.751 and 0.740. “Lack of competence and education about quality management” and “Lack of standardized procedures” both had an RII of 0.742. The statements of “Lack of information and knowledge of quality management”, “Lack of client and supplier involvement”, “Unsuitable Organisational Structure” and “Lack of active community involvement” were the least ranked challenges of TQM implementation at the small towns water supply systems with RII values of 0.513, 0.445, 0.438 and 0.419 respectively. The analysis of the challenges thus revealed that challenges such as poor communication, lack of statistical quality control techniques, absence of long term

planning, inadequate project funds and the lack of customer focus were very significant in TQM implementation considering their relatively high RII values.

5.3 CONCLUSION

This study was carried out to explore the impacts of total quality management (TQM) on completed small towns water supply systems in the Volta Region. The overall analysis of the impacts of TQM on the completed systems revealed that TQM has been impactful especially in the areas of system management through regular recording of project breakdowns and down time, ensuring availability of trained personnel to carry out major repairs when facility breaks down and regular monitoring of project functionality to enhance customer satisfaction.

The research has shown that there are significant factors that affect the implementation of TQM. The main factors were that “Management has a clear vision for implementing quality goals”, “Top-level managers set clear quality goals” and “Management creates quality awareness among employees”. From the analysis, aspects of continuous improvement such as encouraging employees to be creative and innovative as well as performance evaluations of employees are not among the factors affecting TQM implementation. In terms of customer focus, the statement that “The organisation gives full attention to Client Needs” was significant. The study concludes that the support and commitment that management takes in implementing a total quality environment is critical to the success of TQM implementation.

Overall, the analysis of the challenges of TQM implementation in the completed small towns water supply systems has revealed that there are significant challenges including

poor communication, lack of statistical quality control techniques, absence of long Term planning, inadequate project funds and the lack of customer focus. However, some other general challenges to TQM implementation such as lack of client and supplier involvement, unsuitable Organisational Structure, and lack of active community involvement are not very significant in the case of the small towns water supply systems. In this regard, the research therefore concludes that these challenges should be carefully evaluated in the implementation of TQM as ignoring them could serve as barriers to effective TQM.

5.4 RECOMMENDATIONS

Based on the findings of the study, the following recommendations are suggested to enhance TQM implementation and practices in the completed small towns water supply systems:

1. In the first place, successful implementation of TQM in the small towns water supply systems can be achieved through developing effective total quality management system, persistence, and positive hands on leadership.
2. In addition, the study recommends effective management support and commitment to quality management. Management should make available funds and other resources to their quality management departments to enable them achieve the quality objectives. They should include the quality management agenda in all their decision making activities.
3. The study recommends the regular education and training of staff members. This would help empower them and enable them work efficiently. Training and empowerment of staff members is imperative to improve the performance of the small towns water supply systems. Regular education will not only help improve

their capacity to solve quality related problems, but enable them to better understand and implement quality strategies as well as improve upon their motivation to excel on their job.

4. The quality management efforts of the completed small towns water supply systems will be in vain if the community water systems management staff – who directly work on the water systems in the communities- are not adequately trained. In this regard, the study recommends that the Community Water and Sanitation Agency (CWSA) should continuously offer regular trainings for them.
5. The study recommends that government should be consistent in policy making regarding quality management and materials and logistics needed for TQM implementation in the small towns water supply systems should be made available.

5.5 SUGGESTIONS FOR FURTHER RESEARCH

This study has explored TQM implementation for completed small towns water supply systems in the Volta Region. Further research can be conducted to look at the performance of total quality management in relation to consumer satisfaction of the water supply systems. In addition, as this study was limited to only the Volta Region, further studies can be conducted in other regions where there are small towns water supply systems in order to provide a comprehensive understanding of quality management of the systems in the nation at large.

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APPENDIX
RESEARCH QUESTIONNAIRE
KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI
INSTITUTE OF DISTANCE LEARNING

Research Title:

**“IMPACT OF TOTAL QUALITY MANAGEMENT (TQM) ON COMPLETED
SMALL TOWNS WATER SUPPLY SYSTEMS IN THE VOLTA REGION”**

This questionnaire is designed to collect data for the research titled above. This research is conducted as part of an academic requirement for the award of a Master’s degree from the Kwame Nkrumah University of Science and Technology, Kumasi. You are assured that the information obtained from this survey shall be kept anonymous and completely confidential and used for research purposes only. Your participation in this survey is voluntary and I will be grateful if you could answer these questions. I would like to thank you for your cooperation in completing these questions.

Please respond to the questions by either writing in the blank space provided or ticking in the appropriate space provided.

PART 1: BACKGROUND INFORMATION

1) Please indicate the sector you work for and your role

Sector	Role
a) CWSA []	a) Director/Project manager []
b) Community Water System Management Staff []	b) Project engineer []
	c) Hydrologist []
	d) System Manager []
	e) Community relation officer []
	f) Technician Engineer
	g) Other (please specify

2) What is your highest educational qualification?

- a) Basic certificate []
- b) Secondary certificate []
- c) Diploma []
- d) Undergraduate degree []
- e) Postgraduate degree []
- f) Other (please specify)

3) How long have you been working on the small towns water supply systems?

- a) Less than 5 years []
- b) 5 – 10 years []
- c) 11 – 15 years []
- d) 16 – 20 years []
- e) Above 20 years []

4) Which staff category do you belong?

- a) Junior staff []
- b) Senior staff []
- c) Management []

PART 2:

IMPACTS OF TQM ON COMPLETED SMALL TOWNS WATER SUPPLY SYSTEM.

5) Based on your experience, what is your extent of agreement on the following as impacts of Total Quality Management as applicable in your organisation? Please tick in the appropriate space provided. The range of weighting is from 1 to 5 as shown in the table below:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Impacts	1	2	3	4	5
TQM ensure an equitable tariff structure be put in place that is based on operation and maintenance					
TQM ensure the regular recording of project breakdowns and down time					
TQM ensure there is a representative community organization that is trained to manage the projects to everyone's satisfaction					
TQM ensure availability of trained personnel to carry out major repairs when facility breaks down					
TQM ensure regular monitoring of project functionality					
Enhancing compliance with statutory, environment and safety requirement					
Increased project maintenance					

TQM provide support to community decision making and management					
Ensuring customer satisfaction					
TQM ensure support for technical issues that are beyond the capacity of communities to resolve					
Increased project life span					
TQM ensure availability and accessibility of spare parts for projects					
TQM ensure supply chains for spare parts and other service providers operate in a supportive environment					
TQM ensure ability of the beneficiary to carry out maintenance on the facilities					

Part 3: FACTORS AFFECTING TQM IMPLEMENTATION IN THE SMALL TOWNS WATER SUPPLY SYSTEMS.

6) Based on your experience, what is your extent of agreement on the following as factors affecting implementation of Total Quality Management as applicable in your organisation? Please tick in the appropriate space provided. The range of weighting is from 1 to 5 as shown in the table below:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Factors		1	2	3	4	5
	MANAGEMENT COMMITMENT					
1.	Management has a clear vision for implementing quality goals					
2.	Management put emphasis on long-term plan to improve quality					
3.	Top-level managers set clear quality goals					
4.	Management periodically reviews policies and procedures to ensure that proper quality controls are in place					
5.	Management empowers all employees to have adequate knowledge in quality procedures					
6.	Management creates quality awareness among employees					

	CONTINUOUS IMPROVEMENT					
7.	The organisation encourages employees to be creative and innovative in improving processes					
8.	The organisation evaluates performance and take measures to improve on it					
	CUSTOMER FOCUS					
9.	The organisation gives full attention to Client Needs					
10.	The organisation gives feedback forms to Client after delivery of projects					
11.	Community members are actively involved in decision making					
	TRAINING					
12.	Formal training in Quality Policy or TQM is given to employees					
13.	The organisation gives regular training to all employees on the Processes for Improvement					
14.	The organisation gives regular training to all employees on Client Satisfaction.					
15.	The organisation gives regular training on how to gather information concerning Client, Workforce and general works					
16.	The organisation gives regular training to all employees on teamwork					

	EMPLOYEE EMPOWERMENT					
17.	People in the organisation have the knowledge, skill and tools to support them in their duties					
18.	The organisation encourages team work					
19.	Good communication is encouraged to eliminate fear/withdrawal					
20.	Staff members are given the resources necessary to deal with customer complaints					
	PROCESS MANAGEMENT					
21.	There is clear clarity of work processes and methods					
22.	Check sheets are available to monitor the adherence of scheduled processes					

PART 4: CHALLENGES ASSOCIATED WITH IMPLEMENTATION OF TQM IN THE SMALL TOWNS WATER SUPPLY SYSTEMS.

7) Based on your experience, what is your extent of agreement on the following as challenges to the effective implementation of Total Quality Management as applicable in your organisation? Please tick in the appropriate space provided. The range of weighting is from 1 to 5 as shown in the table below:

1	2	3	4	5
Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Challenges		1	2	3	4	5
1.	Lack of information and knowledge of quality management					
2.	Inadequate project funds					
3.	Lack of detailed project planning					
4.	Lack of client and supplier involvement					
5.	Lack of active community involvement					
6.	Lack of support and commitment from executive management					
7.	Lack of competence and education about quality management					
8.	Lack of staff training					
9.	Lack of quality data and limited access to data					
10.	Unsuitable Organisational Structure					

11.	Lack of practical experience in quality management					
12.	Excess Documentation required					
13.	Lack of adequate resources to manage quality					
14.	Lack of statistical quality control techniques					
15.	Lack of standardized procedures					
16.	Lack of cooperation and commitment among project stakeholders					
17.	Absence of Long Term Planning					
18.	Lack of Customer Focus					
19.	Poor Communication					
20.	Lack of Teamwork					

Thank you