The development of a Quality Management implementation model for the Nigerian Space Industry

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This thesis is submitted in partial fulfilment of the requirements for the

award of the degree of Doctor of Philosophy of the University of Portsmouth

Department of Operations and Systems management

Faculty of Business and Law

January 2020

ABSTRACT

There has been a gradual increase in the number of public sector organisations implementing quality management as a strategy to improve performance, improve the quality of public products and services and satisfy the needs of customers. Even though literature in the field relates the success of many public sector organisations in the implementation of quality management, it additionally alludes to the reality that there are barriers to the implementation of quality management. These barriers to quality management implementation are not just from internal factors in the organisation such as a lack of management commitment, but also from external factors such as political interference.

The aim of this research is to determine the perceived factors necessary for successful Quality Management implementation in Nigerian public sector organisations within the space industry. This aim also includes examining the perceived barriers to Quality Management implementation activities in these organisations.

This study uses both quantitative and qualitative methods to achieve the objectives of the research. A questionnaire was designed to determine the perceived factors of Quality Management implementation and to assess the level of implementation as perceived by the employees of these organisations. Semi-structured interviews were also conducted with employees across different management levels to gain an in-depth understanding of enablers to quality management implementation as well as the barriers affecting the implementation process.

The results of data analysis indicate that the level of quality management implementation as perceived by employees in both case organisations, is medium. Further analysis shows that there are variations in opinion regarding the level of implementation across the different management levels in both organisations.

Additionally, the study reveals that the major internal organisational barriers affecting quality management implementation are a lack of top management commitment, a lack of training programmes relating to quality management and lack of quality measurement. The study also reveals that there are external barriers preventing the implementation process which are a lack of facilities, a lack of infrastructure and lack of funds.

The findings of this study make a significant and an original contribution to the academic and practical knowledge of quality management. It is the first exploratory study to have assessed quality management implementation in Nigerian public sector organisations in the space industry. Other than presenting some recommendations for these organisations, the research offers directions for further research in this area.

ACKNOWLEDGEMENT

DECLARATION

Whilst registered as a candidate for the above degree, I have not been registered for any other research award. The results and conclusions embodied in this thesis are the work of the named candidate and have not been submitted for any other academic award.

Jennifer Nguseer Lawal

Word Count: 74,581

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LIST OF ABBREVIATIONS

QM – Quality Management

PSO- Public Sector Organisation

PSOs- Public Sector Organisations

SON- Standards Organisation of Nigeria

ISO- International Standards Organisation

BSI- British Standards Institute

NAFDAC- National Agency for Food, Administration and Control

FDA- Food and Drugs Agency

EFQM- European Foundation of Quality Management

OECD- Organisation for Economic Co-operation for Development

CHAPTER 1

INTRODUCTION

1.1 Overview

This chapter starts with a discussion of the background to the research, highlighting the research gaps which were discovered when reviewing other studies, this is followed by a description of the research aim and objectives, research questions, justification and the significance of the study. Furthermore, this chapter gives the structure of the study.

1.2 Background of the study

The public sector of every country is relevant to her national development. The public sector plays an important role in every society as it responsible for aiding the qualitative development of society, ensuring economic and social balance, and providing the necessities of life to citizens. The public sector has the responsibility of providing high-quality and well-functioning systems through the effective management and use of public funds (Obasa, 2015, p.1). The government uses its ministries, departments and agencies to set up policies and projects that helps facilitate development and economic progress of the country (Imhonopi & Urim, 2013, p.79).

Finding a common definition of the public sector is difficult because a single definition may not fit all contexts, as different countries have different understanding of what constitutes their public sector. The definition given by the Organisation for Economic Co-operation for Development (OECD) has been adopted to define the public sector as it relates to this study:

According to the OECD, "*the public sector comprises the general government sector plus all public corporations including the central bank". The government sector basically covers two entities: all departments, offices and other bodies which furnish, but normally do not sell to the community, those common services, other than higher education, which cannot otherwise be conveniently and economically provided, as well as those that administer the state and the economic and social policy of the community;*

• Non-Profit Institutions (NPI's) - controlled and mainly financed by government, ...this sector should include all bodies, departments and establishments of government – central, state or provincial, district or county, municipal, town or village – that engage in a wide range of activities, such as: administration; defence and regulation of public order; health, education,

cultural, recreational, and other social services; promotion of economic growth and welfare; and technological development. The legislature, the executive, departments, establishments and other bodies of government should be included, irrespective of their treatment in government accounts. Government-administered social security funds are also included" (OECD 2002, p.63).

The structure of the public sector differs by country, however, the public sector in most countries usually includes the military, the police, healthcare, education, roads and public transportation (Obasa, 2015, p.2).

Luoma-aho (2008, p. 446) described public sector organisations (PSOs) as organisations consisting of core regulatory part of government (civil service organisations) and others that work underneath their administration. The sector also consists of agencies, and entities that implement government policies, programmes and provide public goods and services to its citizens. These organisations' sources of funds are from taxes, fees, charges and direct budgetary allocations from the government. These organisations can include ministries, departments, agencies, enterprises, corporations and statutory bodies (Dube & Danescu 2011, p.3; Scott 1996, p.1).

At the centre of public sector is the civil service, which in most countries includes government ministries, departments, and other branches of government that are essential parts of the core government structure. They are directly accountable to the federal government authority (Dube & Danescu 2011, p. 4; Kauzya 2005, p. 179; Burnham & Pyper 2008, p. 20). At the federal level of government, these organisation report to the federal executive or legislature; at the state level, they report to the State executive or legislature. In Nigeria, examples include the Ministry of Science and Technology and the Ministry of Education and Ministry of Health.

Outside the civil service, is the public service which consists of Agencies and Enterprises. Agencies consist of organisations that are a division of the government and deliver public programs, goods, or services, however they exist as distinct organisations in their own right — potentially as legitimate entities— and function with an amount of operational independence. They are mostly, but not always, supervised by a board of directors, commission, or other appointed body (Dube & Danescu, 2011, p. 4). Examples of agencies in Nigeria include the National Space Research and Development Agency, Nigerian Independent National Electoral Commission (INEC), Independent Corrupt practices and related offences Commission (ICPC), Code of Conduct Bureau and National Population Commission. Enterprises on the other hand,

are organisations that provide public goods and/or services, they function independently of government and most times have their own sources of income in addition to government funding. They may also compete in private markets and may make profits. However, in most cases the government is the major shareholder, and these enterprises partially follow the regulations that govern the core government (Dube & Danescu, 2011, p. 4). All the profit and financial gain of the public enterprise flows back to the subsector of the government that owns it. Examples include Nigeria Postal Service, Nigeria Communication Satellite Limited (NigComSat) and Galaxy Backbone Ltd who are supervised by the Nigerian Ministry of Communications and Digital Economy

Globally, PSOs are confronted with unique challenges stimulated by factors like government policies, budgetary burdens, an increasing demand for transparency and financial accountability for public funds, advances in information technology together with changing public expectations of the public sector requiring new approaches and solutions (Wynen, Verhost & Demuzere, 2015, p.122). PSOs are therefore on the lookout for new processes, techniques and technologies to increase process efficiency, reduce costs, improve quality of public goods and services and encourage greater accountability (Wynen, Verhost & Demuzere, 2015, p.122). By implementing best practices in various management practices, private sector organisations have achieved an increase in the quality of goods and services and driven down costs by increasing efficiency and processing capacity. Presently, PSOs are under pressure to deliver the same successes as private organisations (Alford & Greve, 2017, p.4). Considerable evidence can also be found in literature supporting the hypothesis that an efficient use of management approaches is critical to an efficient public sector (Stringham, 2004, p. 187; Mbecke, 2014, p. 38;). Among the management approaches implemented to improve the quality of products and services is Quality Management with a wide variety of approaches which organisations can choose from to implement (Matei & Lazar, 2011, p.66)

1.3 Research Context

This section provides the reader with the research context concerning the country in which this study was conducted. This section has been divided into three parts, the first part is a brief review of Nigeria, comprising the population, national culture, and some information on Nigeria's current economic development. The second part of this looks at the nature of the Nigerian public sector and the third part presents a historical overview of the Nigerian space industry.

1.3.1 Nigeria

With an estimated population of 250 million, Nigeria is considered to be the most populous country in Africa (Britannica.com). Nigeria is a multilingual and multicultural country with over five hundred ethnic groups, of which the three largest are Hausa, Igbo and Yoruba. Although the official language is English, there are over six hundred distinct ethnic languages spoken in Nigeria (AnswersAfrica.com).

Nigeria is a federal republic with three tiers of government: Federal (central) government, State government (36 states and a federal capital, Abuja) and Local government authorities (774 LGAs). The states own and manage their resources and equally take charge of all remaining matters that affect the state, while the federal government takes charge of a few exclusive matters of national interest such as: defence, foreign policy, currency regulations. The core functions of local government include; primary and adult education; public health; town planning; roads and transport; agricultural and national resource development and waste disposal (Sanusi, Tabi'u & Mohamed, 2013, p.153). The funds raised by taxes are collected by all levels of government, with local government being responsible for collecting licence fees for haulage, trade and motor vehicles. All revenue collected is pooled in the federal account which is in turn split across the three tiers of government. (Commonwealth Local Government Forum (CLGF), 2018). The organisations used in this study are controlled by the Nigerian federal government.

Nigeria's economy is one of the largest in Africa, with a GDP greater than $400 billion (World Bank.org). This growth is mainly driven by the oil and gas sector with contribution from other sectors such as financial services, telecommunications and entertainment. The Nigeria economic system is a mixed economic system, which is a system where the private and public sectors work in parallel to each other (Bogolib, 2013, p.126). Usually in this type of system, the public sector is responsible to provide transport, communication, defence, currency management, utilities like telephone, water, gas and electricity, while all the other industries are in the ownership of private sector (Shaikh, 2012).

The next sub-section discusses the definition of public sector and the structure of the public sector in Nigeria and where the organisations used in this research fall within this structure.

1.3.2 The Nigerian Public Sector

According to Junaidu & Aminu, (2015, p. 62), the Nigerian Public sector encompasses the Civil Service (Ministerial departments), Statutory Corporations or Parastatals, Judiciary, Legislature, Educational Institutions (financially or principally owned by government at the State, Local and Federal levels), Nigeria Police or Armed Forces and other organisations in which the Federal or state governments owns controlling share or interest

Krukru (2015, p. 5) uses three broad concepts to classify Nigerian PSOs in line with their operational objectives. They include; the public utility type, the commercial enterprise type, and the hybrid type. The public utility companies are strictly of a social service nature whose primary objective is to satisfy the public and not to make profit whereas the commercial enterprises are incorporated with a profit motive. The hybrid organisation combines the characteristics of commercial and public utility organization by offering affordable goods and services to the public while at the same time striving to remain self-reliant. This classification is necessary as it can be used in assessing the performance of a PSO based on its primary objective.

Orluwene, (2001, p. 265) gives four forms in which PSOs can be classified in Nigeria. They are; Departmental Undertaking, Statutory Corporation, Government Companies and Public Contractors.

i. Departmental Undertaking- this form of organisation is primarily used for provision of essential services such as transportation, postal services, water and broadcasting. Such organisations function under the overall control of a ministry of the government and are financed and controlled in the same way as any other government department. This form is considered suitable for activities where the government desires to have control over them in view of the public interest Examples include Nigerian Postal Services (Nipost) and Nigeria Television Authority (NTA)

ii. Statutory Corporation (or public corporation) refers to a corporate body created by the legislature by an act which defines its powers, functions and pattern of management. A statutory corporation is also known as a public corporation. Its capital is wholly provided by the government. Examples include Nigerian Agricultural Insurance Corporation (NAIC), Nigeria Deposit Insurance Corporation (NDIC), and Nigerian National Petroleum Corporation (NNPC)

iii. Government Company refers to the company in which 51 percent or more of the paid up capital is held by the government. It is registered under the Companies Act and is fully governed by the provisions of the Act. An example is the Nigeria Communications Satellite Limited (NIGCOMSAT).

iv. Public contractors- in this form of organisation, the government enters into a contract with a private company for the management of an enterprise. The contractor is paid to deliver public programs, goods, or services. An example is Galaxy Backbone Ltd.

In this research context, the focus is on public organisations within the Nigerian space industry which according to the classification by Orluwene, (2001, p. 265), one of the case studies, is a government undertaking while the other is a government company which at the time of this research is still wholly owned by the Nigerian government. From the next section, the review will be centred on the Nigerian space industry.

1.3.3 The Nigerian Space Industry

Governments of different countries have gone beyond their traditional responsibility and now engage in economic activities which are deemed instrumental to national development (Meheret, 2014, p.333; Florio, 2014, p. 202). These governments all over the world have become active in many spheres of economic activity by engaging in direct production and distribution of a variety of goods and services. To accomplish this, one of the options is setting up entities that undertake commercial activities. These entities are known by many names such as public enterprises, government corporations, government business enterprises, government-linked companies, parastatals, nationalised industries, public sector units or enterprises and state-owned enterprises (Kauzya, 2005, p.4). The reason why such entities are created and the extent to which such a role is assumed by the government varies depending on the political economy or ideology of a state (Meheret, 2014, 334).

In the context of developing countries such as Nigeria, six reasons have been identified in literature for setting up organisations in certain industries such as the space industry (Arowolo & Ologunowa, 2012, p. 789; Kauzya, 2005, p. 6; Nwoye, 2011, p.2; Ozor, 2004, p. 111). The first of which is development emphasis, in many developing countries, the resources available to the private sector are not adequate for the provision of certain goods and services for example, the investment required in the construction of a hydroelectricity-generating plant or a water scheme for large urban centre is quite enormous and the returns on such investment will take a very long time to realize. The second reason is political considerations. Political

considerations influence a government's involvement in the provision of certain social and economic services. In many African countries, development is closely associated with the provision of social services; consequently, the performance of the government, in many of these countries, is evaluated on the basis of its ability to provide different types of public services in areas where such services do not exist. The third reason is accessibility, governments intervene in the provision of public and merit goods such as basic nutrition or health services in order for such goods and services to be accessible to all. The fourth reason is consumer protection. This relates to the need to protect the consumer from private monopolists who may produce and price goods and services at levels which are not socially optimal. Governments, therefore, step in to provide such goods and services and subsidise their consumption. The Fifth reason is that PSOs can also be used to foster industries that are considered economically desirable and that would not otherwise be developed through private investment. When these industries have potentially important spill-overs within or across sectors, the state might decide to invest instead. Private companies might for example be reluctant to invest in research especially when the protection of intellectual property is considered weak, or if the gains from the research would be difficult to capitalise on. Public sector research institutions might then yield long-term benefits for the economy. The Sixth reason for governmental intervention is the consciousness of national security. The security of the nation may be at stake if private investors handle and thus become acquainted with information regarding vital defence equipment and strategic military locations and installations.

Consequently, in 1999, with the approval of the Nigerian National Space Policy, the National Space Research and Development Agency (NASRDA) was established whose mission according to Boroffice (2008, p.40) is to "*vigorously pursue the attainment of space capabilities and the enhancement of quality of life of its people*".

After the establishment of NASRDA, a multi-institution strategy was adopted by the agency to accomplish its mandate of pursuing the development and application of space focused science and technology for the socio-economic benefits of the nation, as such six research centres and two companies were established. The research centres are; Centre for Satellite Technology Development, Centre for Remote sensing, Centre for Space Transport and Propulsion, Centre for Geodesy and Geodynamics, Centre for Space Science and Technology Education and Centre for Basic Space Science and Sstronomy. The two companies are the Nigeria Communication Satellite (NigComSat) Limited and the GeoApps Plus Limited. NigComSat

Limited was established in 2006 to market products from the Nigerian communication satellites while GeoApps Plus Limited was set up in 2007 to market products from the Nigerian earth observation satellites (James, Halilu & Akinyede, 2014, p. 24).

In 2003 the country built and launched its first satellite, NigeriaSat-1, as part of a world disaster monitoring and relief constellation. Since then, four satellites have launched which have helped improve agricultural practices, collect climate data and help in the fight against insurgency in the North-East part of the country (Giles, 2018).

The Nigeria space industry has made progressive steps in terms of science and technological development in space exploration (Oyewole, 2019). However, public organisations in this sector have faced challenges which have hindered them from unlocking the full potential of the sector. These challenges are discussed in the next sub-section of this chapter.

1.4 Factors affecting the performance of public sector organisations

There have also been some arguments against the rational of establishing PSOs which carry out functions such as those given by Kruku (2015, p.5) in section 1.3.2 above. These arguments are based on evidence that the performance of some of these organisations have been seen to be less efficient as compared to privately owned organisations. These organisations have been criticized for lack of productivity, efficiency and transparency (Anyadike, 2013, p. 68). Their operational performance has largely been seen as inefficient and far below the social and economic objectives for which they were established (Ogohi, 2014, p. 25; Omisore, 2013, p. 18).

Many problems of PSOs' performance can be traced to difficulties with goal clarity and measurement (Economic Commission for Africa, 2014, p. 26), undue hands-on and politically motivated ownership interference (Fan & Hope, 2016, p. 3) unclear lines of responsibility, a lack of accountability and efficiency losses in the corporate operations (OECD, 2015, p. 12). Official or unofficial exemptions from bankruptcy rules can further reduce performance incentives (MacCarthaigh, 2011, p. 218). PSOs also tend to employ excess labour inputs as they are exposed to pressure to hire management or employees according to politically-motivated reasons, rather than qualification (Okeke, Onuorah, & Okonkwo, 2016, p.47). Also, objectives pursued by PSOs are often not well defined and often change with different administrations and change in policies (Ghosh & Whalley, 2008; Obasa, 2014, p. 234). All of these have been attributed to the same factors affecting public organisations in other sectors, such as; managerial inefficiency, government interference, bureaucracy, corruption, poor staff

relationship, lack of employee motivation, conflicting objectives, lack of training and development, excessive control, nepotism. Of all the identified causal factors, management related factors are generally considered predominant (Idam, 2014, p. 25; Obasa, 2014, p. 234).

The demands on efficiency and quality in PSOs within this industry has increased over the past few years and public agencies have come under pressure and debate in terms of poor product and service delivery with respect to the needs and rights of the citizens. (Egbunu, 2017; Esu & Inyang, 2009, p.99). On the one hand, these organisations are faced with providing public goods and services against a back-drop of smaller budgets and on the other hand however, this opens up opportunities for the exploration of strategies that governments can adopt to better the lives of their citizens (Egbunu, 2017). Strategies such as Quality Management (QM) which has been described as a management concept that provides a set of hard and soft management improvement techniques and tools to meet the challenges faced by public organisations (Frost-Kumpf, 1994). QM is typically recognised as management paradigm for improving performance and competitiveness (Okuntade, 2015, p.11, Irechukwu, 2010, p.211).

A fundamental question that has risen is centred on whether or not the Nigerian public sector environment enables the implementation of QM. According to Ejumudo, (2009, p. 152), QM is practicable in the Nigerian public sector, however, its reality requires "*a comprehensive and pragmatic non-political administrative restructuring, re-engineering and re-organization to meet the changing demands of the sector, institutional support and sustained effort to transform such reform initiatives (plans) into concrete reality as well as customer focus and orientation. Additionally, there must be attitudinal change at the macro (governmental) and micro (organizational) levels such that there will be genuine support for and commitment to the realization of QM philosophy, policy, plan and practice in the public sector*"

Studies show that QM implementation in Nigerian organisations is encouraging (Orumwense, 2014, p. 1; Ibidunni, Salau, Falola, Ayeni & Obunabor, 2017, p.296). Its application in the Nigerian private sector organisations have been reported to improve customer satisfaction, reduce cost, improve quality output and improve employee performance (Irechukwu, 2010, p.211; Ezenyilimba, Ezejiofor & Afodigbueokwu, 2019, p.20; Ayandele & Akpan, 2015, p.72).

Quality management implementation in some Nigerian PSOs has also been reported to benefit the organisations such as the study of QM implementation in a public hospital by Ozdal and Oyebamiji (2018, p.5) who reported an improvement in health care service delivery and improved employee performance. Ozdal & Oyebamiji (2018, p.5) identified nine factors as

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important to the success of QM implementation in the hospital. These factors include; leadership, continuous improvement, training and education, reward and recognition, communication, customer satisfaction, team work, employee participation and employees' satisfaction. Babatunde and Victor (2018, p.186) also reported improvement in the inter-personal relationship between teachers in a secondary school in Ondo State, Nigeria. This was achieved by adopting teamwork practices such as the involvement of teachers in developing the school's vision and mission and setting up school committees to enhance teamwork among staff.

Despite top executives of organisations being aware of QM and some organisations benefitting from QM implementation, some authors believe that the level of QM implementation is still low in Nigeria to achieve the maximum benefits of its implementation (Alintah-Abel, Okolie, Emoh &Agu, 2018, p.33; Jimoh, Oyewobi, Isa & Waziri, 2018, p.164; Akinola, Akinradewo, Olatunji, 2012, p.225). This has been attributed to barriers which prevent organisations from successfully implementing quality initiatives. Among the barriers for low implementation or unsuccessful implementation, Okuntade (2015, p.9) mentioned lack of top management support, lack of team/team building skills, lack of training of employees at all levels. Ajayi and Osunsanmi (2018, p.1765) identified lack of available quality system documentation, lack of understanding in the process requirement, high cost of implementation, lack of planning. And inefficient infrastructure (Obasa, 2015, p.3)

Studies on QM including the factors for successful implementation and barriers hindering the implementation reviewed in section 2.6 indicated that there is an absence of studies which concentrate on the identification of the success factors critical to the implementation of QM in Nigerian PSOs in the space industry. Therefore, this research investigates the perceived factors to enable the implementation of QM initiatives in Nigerian PSOs within the space industry. Furthermore, the study determines the barriers perceived to be hindering the implementing QM initiatives in these organisations.

1.5 Justification of the study

In Nigeria, PSOs in certain sectors such as the space industry have been established to facilitate social and economic development in a sector that was not considered expedient by private sector investment by foreign and local investors (Arowolo & Ologunowa, 2012, p. 789; Kauzya, 2005, p. 6; Nwoye, 2011; Ozor, 2004, p. 111). However, the public organisations

established to fill this vacuum have been faced with many challenges that has constrained their ability to perform optimally (Okeke, Onuorah, & Okonkwo, 2016, p.46; Shebbs, 2015, p.48).

To overcome these challenges, many public managers have introduced initiatives which will concentrate on accountability to customers, restructure bureaucratic processes, redefine organisational missions, streamline agency processes, and decentralise decision making (Denhardt & Denhardt, 2003, p. 13). Quality Management (TQM) is an initiative that falls within this category (Maram, 2008, p. 200).

Studies have suggested both positive and negative impacts of implementing QM in public sector organisations (Stringham, 2004, p. 187; Mbecke, 2014, p. 38; Moura, 2011; Fountain, 2001, p. 67; Moore, 2002, p. 300; Idam, 2014, p.27). However, most of these studies done in Nigeria have been carried out in private sector organisations as discussed in section 2.6. A few have been done in public sector organisations largely focusing on the health sector and the education sector but no study has been carried out to investigate QM implementation in the Nigerian space sector.

It is not only important to study how QM is applied in the Nigerian public sector, because QM was originally developed in private sector organisations and PSOs are trying to apply management techniques and tools developed in the private sector. There is a need for further context specific studies to investigate the outcome of implementation of QM in the Nigerian space sector. It is necessary to investigate and document the experiences of these organisations who in the quest to deliver quality goods and service have faced a number of unique challenges. The research is needed to highlight required enablers and key learning opportunities for Nigerian PSOs in the space sector, to reform and improve their performance.

1.6 Aims and Objectives

The aim of this research was to determine the perceived factors necessary for successful QM implementation in Nigerian PSOs within the space industry. This aim also includes examining the perceived barriers to QM implementation activities in these organisations.

1.6.1 The research objectives and questions

The study has five objectives to explore the implementation of QM in the context of Nigerian PSOs in the space industry. The research objectives were derived from the research gaps that were identified in the existing literature on QM implementation. Specifically, the objectives of this study are to:

i.   Identify the definition of quality by Nigerian PSOs in the space industry.

ii.   Investigate the approaches adopted by Nigerian PSOs in the space industry in implementing QM.

iii. Identify the key factors of QM which are perceived to enable these organisations in implementing QM initiatives.

iv.   Evaluate the perceived level of implementation of the QM factors within these organisations.

v.   Examine the perceived barriers hindering the successful implementation of QM initiatives within these organisations

vi.   Develop a model to facilitate QM implementation in public sector organisations in the Nigerian space industry.

The research objectives were examined by discussing and answering the ensuing research questions:

1. How is quality defined by Nigerian PSOs in the space industry?
2. What is the common approach/approaches utilised by Nigerian PSOs in the space industry in implementing QM?
3. What are the QM factors necessary for successful QM implementation as perceived by employees in these organisations?
4. What is the perceived level of implementation of QM factors?
5. What are the QM factors that should be considered at every management level of the organisations in this study, to encourage QM implementation?
6. What are the barriers hindering the on-going implementation of QM initiatives in these organisations?

1.7 Significance of the study

This work is significant as it adds to the existing literature on the QM concept by identifying factors that enable its implementation in PSOs in the Nigerian space industry. This empirical study looked to address the gap that exists in the literature. Additionally, this study is anticipated to inspire additional studies on QM implementation in the public sector context and QM studies in developing countries based on the limited studies of the available literature. Academics will through this work, be able to comprehend how QM operates in developing nations such as Nigeria, the contrasts between organisations within the same sector, differences in opinion across management levels in the same organisation and factors that hinder QM

implementation in these organisations. Additionally, this study provides a model whereby QM can be effectively implemented in Nigerian PSOs in the space industry. This would provide opportunities for further investigation. This study also contributes to the enhancement of organisational strategies via a comprehension of the QM concept. Furthermore, identifying the enablers for QM is crucial to encourage PSOs to improve their performance and implement the plans and policies of the Nigerian government.

Nigeria stands to benefit a lot from the efficient functioning of PSOs in the space industry as space programs are believed to play a vital part in the economic development of a country. It is accepted globally that developing technology drives growth and that the space economy is a great area for technology development (Bigliardi & Galati, 2014, p.158).

1.8 Thesis Outline

This thesis is outlined into five parts comprising seven chapters in total; this is illustrated in Figure 1.1.

Chapter 1: Introduction

This present section introduces the study, including the background, the justification of the study, the research aims and objectives and research questions. This is followed by the significance and the structure of the study.

Chapter 2: Literature review

In this chapter, the concept of QM is discussed, its evolution and approaches for implementation. The chapter also discusses QM implementation in the public sector with a focus on the Nigerian public sector. A review of QM implementation in Nigeria and the public sector was carried out. Also, a review of key factors for QM implementation as well as the barriers to successful QM implementation was done.

Chapter 3: Methodology

The research philosophy upon which the research was carried out is highlighted in this chapter as well as the research methodology adopted for the study. A mixed method approach was adopted for the research whereby quantitative and qualitative data were collected and analysed concurrently. Reflexivity during the research, was also described in this chapter.

Chapter 4: Data Analysis and Discussion: Case Study 1

This chapter is divided into three parts; part one presents the process of quantitative data analysis of the questionnaires and the results, part two describes the process for thematic data analysis of the semi-structured interviews while part three discusses the findings for case study one.

Chapter 5: Data Analysis and Discussion: Case Study 2

This chapter is also divided into three parts, presenting the quantitative and qualitative data analysis and findings for case study 2.

Chapter 6: Cross case data analysis and discussion

In this chapter, a cross case analysis of the case organisations used in this study is carried out. A model derived from the findings from the study for quality improvement is also discussed in this chapter.

Chapter 7: Conclusion

The thesis concludes by providing a summary of the conclusions derived for each objective of this research, the contribution of the study and recommendations for further studies are also presented. See figure 1.1 below

1 • Introduction

2 • Literature Review

3 • Research Mathodology

4 • Data Analysis and Discussion: Case Study 1

5 • Data Analysis and Discussion: Case Study 2

6 • Cross-case Analysis and Discussion

7 • Conclusion

Figure 1.1 Outline of thesis (by Author)

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

To fully understand the concept of Quality and its implementation, it is useful to start by looking at the definition of quality, its history and how it has evolved over time in the field of management science. This chapter considers the diverse definitions of quality, how the quality concept has developed over time and the benefits of its implementation. The chapter also discusses the different approaches to quality implementation, the implementation of quality management as a philosophy in the Nigerian public sector, factors necessary for successful implementation and concludes by discussing challenges of implementing quality management in the public sector.

2.1 Definition of Quality

Quality is one of the most important aspects of an organisation as it can be associated with many factors such as trust, reliability and dependability. A reputation for quality is an invaluable asset for an organisation and it takes time to build it however it can be ruined easily (Merih, 2016, p.2)

Quality can be defined in many ways due to its diverse understandings among academics, people in business and the general public who are the end users of products and services (Speegle, 2010, p. 12; Ebrahimi & Sadeghi, 2013, p. 5626). There are various definitions made by several authors who define quality as;

'*A product or a service possess quality if it helps somebody and it enjoys sustainable market*– Deming (1994, p. 2)

'C*onformance to requirements'-* Crosby (1979, p.15)

'*Fitness for use'*- Juran (1995, p.15)

'*Quality is meeting customer requirements'*- Oakland (1997, p.3)

'*Quality is a dynamic state associated with products, services, people and processes that meets or exceeds expectations and helps produce superior value'* – Goetsch & Davies (2013, p.4)

Some organisations have also put forth their definition. Examples are

British Standards Institute (BS 4778- 1991) – *"Quality is the totality of features and characteristics that bear on the ability of product or service to satisfy a given need"*

International Standard Organisation (ISO 9000: 2015)- *"Quality is the totality of characteristics of an entity that bear on its ability to satisfy stated or implied needs"*.

American Society of Quality- *"Quality can have two meanings: the characteristics of a product or service that bear on its ability to satisfy stated or implied needs; and a product or service free of deficiencies"*.

The definition of quality is said to have evolved over the years, from *"a product-based definition which originated in the manufacturing sector to a customer-based definition which integrates service within the service sector and the service element of manufactured products"* (Kelemen, 2003, p.24). The next section of this chapter therefore presents a history of evolvement of quality.

2.2 History of the quality concept

The development of Quality is usually presented based on how it evolved in developed countries where western literature describes the evolution of the quality concept from inspection to total quality management, tracing its origin back to medieval Europe. For example, Garvin (1988, p.3) divides the development of quality in the western world into four eras while Knowles (2011, p.13) further divides the development of quality in the western world into six eras; Craftsmanship era, Standardization, Mass production and Quality assurance, Quality control era, Total Quality management era, Standards and Awards, and Initiative era. However, this description is not valid for most developing countries, such as Nigeria, because where organisations in developed countries have adopted a quality-oriented strategy, adoption of even basic quality control may be a struggle for many organisations in some developing countries (Isaksson & Douglas, 2016, p.2; Mersha, 2000, p.119). This however does not mean that the concept of quality is absent in developing countries but little literature exists to this end.

According to western literature (Kolb & Hoover, 2012, p.7; Knowles, 2011, p.14), quality development can be traced back to medieval Europe in the thirteenth century when craftsmen organised into unions called guilds. The approach to quality in this era was inspection where inspection marks served as proof of quality. This approach was dominant until an industrial revolution arose in the United Kingdom in the early nineteenth century. Quality during the

standardization and inspection era was ensured through inspections where quality of work was removed from the individual worker and placed on the quality department which employed the inspector (Kolb & Hoover, 2012, p.7; Knowles, 2011, p.14). The work of Frederick Winslow Taylor, an influential industrial engineer in the United States in the early twentieth century legitimised the use of inspectors to ensure adequate quality of finished goods. His approach to factory management, which he called scientific management, aimed to increase productivity without increasing the number of skilled craftsmen. However, the poor performance of the scientific management system which had led to the requirement for inspection of products for defects after manufacture led to the Quality Control era which marked the inclusion of 'processes' in quality practices. This era continued into the mid-twentieth century when William Edwards Deming, demonstrated that statistical controls could be used in clerical as well as in industrial operations in the 1940 American census. Deming was able to apply his statistical knowledge to the Japanese situation as the Japanese industrial system had had been brutally ravaged by World War II. He taught them how to apply statistical methods and team approach to quality improvement using the philosophy that charts, checklists, as well as an uncompromising focus on the consumer were important factors to building a quality product. The Japanese were able to turnaround the quality of their products, transforming Japan into a market leader of every form of manufactured good (Kolb & Hoover, 2012, p.9). American companies quickly learnt that Japanese companies focus was on companywide quality control, taking their time to understand the manufacturing process at all management levels and working hard to continually improve it. This approach enabled them to produce high quality products at low prices. This move motivated American companies to commence their own quality initiatives which led to a new phase of continuous quality improvement known as Total Quality Management between the 1980s and 1990s.

According to Knowles (2011), the need for standardization of the quality principles was felt. This brought about the development of quality standards such as the British Standards, BS5770 and the International Standards Organization, ISO 9000 Quality systems standards. These have been joined by Quality or Excellence Awards which are recognitions of company approaches and performance.

In the initiatives' era, the quality concept has matured where new initiatives have advanced beyond the foundations laid by Deming and the early Japanese experts of quality. Examples of some quality initiatives developed in this era are; Six Sigma and Quality function deployment. Knowles, (2011, p. 12) however, emphasises that the arrival of a new era does not mean that

the principles and practices championed by earlier eras faded away; on the contrary there are many examples of craftsmanship or quality control still practiced today. Also, the beginning of each era as presented in this chapter does not represent the first delivery of theories or approaches, but highlights where they became mainstream and became prominent in the quality domain.

2.3 Quality Management

Quality management has been defined by Leong, Zakuan, & Saman, (2012, p.689) as all "*the activities that ensure that products and services are of good quality have to be managed in order to maintain consistency*". Quality Management (QM) centres around product and service quality, as well as on the way to accomplish it, utilizing quality planning, assurance and control of processes as well as products to accomplish consistent quality (Okolie, Obika & Nwuzor, 2018, p.1). Knowles, (2011, p.17) posits that the period of QM observed today has developed as a review of traditional methods to management. Traditional organisations have been seen to emphasize on management which is more concerned about creating order and constancy through activities such as planning, budgeting, organising and controlling, while lacking leadership. Knowles (2011, p.17) also believes that QM on the other hand is concerned with producing change and movement by vision building, motivating, aligning people and communicating. Traditional organisations, unlike organisations with a QM system in place, have a short term focus, lack customer focus, believe that better quality costs more money, lack systems thinking and underestimate the potential and contribution of employees across the organisation.

A review of literature reveals that organisations in different countries in both private and public sectors have recorded positive results from the implementation of QM within their organisations (Ab Rahaman, Shokshok & Abd Wahab, 2011, p.623; Anthony, Rogers & Cudney, 2019, p.617). Lakhe and Mohanty (1994, p.21) refer to these positive results as tangible and intangible benefits where tangible benefits are results which have a direct financial value such as increases in productivity, reductions in the cost of production, reduced waste, increased profit and increased competitive advantage. While intangible benefits are items which are problematic to quantify in only financial terms but are significant to organisational competitiveness such as customer satisfaction, improved workforce satisfaction and motivation, and improved environmental impact. Studies by various researchers have recorded the positive impact of QM implementation in private sector organisations such as increased

customer satisfaction, improved work environment for employees, improved teamwork, reduction in waste and improved employee satisfaction (Ab Rahman, Shokshok & Abd. Wahab, 2011, p.623), more repeat customers, reduced rework, and better chances in winning contracts in international markets (Polat, Damci & Tatar, 2011, p.1118) lower scrap, improved product reliability, decreased time-to-market cycles and decreased customer service problems (Ware, 2014, p.99). Žeželj, (2013, p.397) also noted that the introduction of a QM system in a company leads to: a continuous and constant improvement, increased competitiveness, increased efficiency and profitability, clear procedures, reduction of errors, reduction of production time, better motivation, better communication and disclosure of information, improvement of the image, safety and reliability of products and services, better management of human resources, and most importantly, focus on customers.

Public sector organisations have also benefited from the implementation of QM. A study by To, Lee, & Yu (2011, p.67) of QM implementation in public sector organisation, in China showed that QM implementation is significantly associated with positive customer feedback and behavioural response in terms of word of mouth. In other words, QM implementation can improve the quality of public service delivery from the external and internal customer perspectives. Schroeder-Printzen's (2014, p. 16) study of QM implementation in healthcare recorded benefits for both the customers of the hospital (which are the patients, health insuraners, other hospitals and doctors in private practice) and the hospital itself. A review of 52 studies of QM within Higher Education Institutes (HEIs) by Papanthymou & Darra (2017, p. 135) revealed that implementation of QM has been to a great advantage to organisations that carried out implementation.

Despite the successes recorded on the benefits and gains of QM implementation, some studies have recorded negative results from the implementation of quality improvement programmes in their organisations (Fisher, Dauterive, & Barfield, 2001, p.985; Paul, Evans, & Matthews, 2005, p.23)

Considering different appraisals that have been carried out on QM implementation, resulting in a mixture of positive and negative experiences, it is necessary to consider what are the key requirements for QM implementation. Thus, the next section discusses what is recorded in literature to be requirements for successful QM implementation in organisations.

2.4 Quality Management Implementation.

Literature suggests that QM consists of a set of interdependent components which organisations must develop in an integrated manner for successful implementation (Deming 1994, p.50; Hellsten & Klefsjö, 2000, p.238; Tarí, 2005, p.183), thus, the definition of quality management by Flynn, Schroeder and Sakakibara (1994, p.342) describing quality management as "*an integrated approach to achieving and sustaining high quality output*".

According to literature, these components may be grouped into two or three dimensions. Studies which group the components into two, either group them as soft and hard components (Wilkinson, Redman, Snape, Marchington, 1998, p.50; Fotopoulos & Psomas, 2009, p.150; Douglas & Douglas, 2015, p.5) or the technical system and the management system (non-technical system) (Leong, Zakuan, & Saman, 2012, p.689). Studies which group the components into three, categorise them as principles or values, techniques and tools (Hellsten & Klefsjö, 2000, p.238; Tarí, (2005, p.183). This study will be based on the later components; Principles, Techniques and Tools. This choice is because this classification provides a clear distinction between QM principles, QM techniques and QM tools which is not the case with other classifications. Many authors fail to distinguish between these components which in the opinion of the researcher might create confusion. According to Hellsten and Klefsjö, (2000, p.241), using terminologies based on principles, techniques and tools provides clarity and simplifies the QM concept for organisations implementing QM initiatives.

The principles of QM are the foundation of the culture of the organisation, the techniques of QM consist of a number of actions done in a certain order to achieve the principles while tools of QM are seen as devices which sometimes have a statistical basis to support decision making or facilitate analysis of data (Hellsten & Klefsjö, 2000, p.238; Tarí, (2005, p.183). The techniques and tools of QM are sometimes used interchangeably in literature but Tarí, (2005, p.183) distinguishes between the two as follows; "*A single tool is a device with a clear function, and is usually applied on its own, whereas a technique has a wider application and is understood as a set of tools*". Techniques and tools are believed to be essential for the support and development of the quality improvement process (Curry & Kadasah, 2002, p.208). These QM components are discussed below;

2.4.1 Principles

The Principles of QM are also called other names by different authors such as values (Hellsten & Klefsjö, 2000, p.240) or elements (Curry & Kadasah, 2002, p.208). The principles and

number of principles of QM differ among authors. However, a study of literature shows that a number of principles are common among the different descriptions, namely; customer focus, management commitment and leadership, employee engagement and continuous improvement. The International Standards Organisation (ISO) recommends seven QM principles which include: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making and relationship management (www.iso.org).

The second component of QM implementation is Technique and is discussed in the next section

2.4.2 Techniques

According to Fonseca, Lima & Silva (2015, p. 605), QM techniques are a set of tools and have a wider application for example the technique; statistical process control can be applied using histograms, process diagrams and control charts. Strategic policy deployment can be applied using Plan-Do-Check-Act Cycle, benchmarking, X-matrix design and value stream mapping (Ahmed, 2016, p.171; Jacobson, 2018)

2.4.3 Tools

Quality management tools have a clear function and are applied by themselves. There are many of these QM tools identified in literature, however, the most recognised and used tools are those said to have been developed by Ishikawa known as the seven basic Quality Tools (Neyestani, 2017b, p.2). They include; histogram, cause and effect diagram, check sheet, Pareto chart, flow chart, control chart and scatter diagram (Magar & Shinde, 2014, p.364). Seven other management tools were also developed by a team of Japanese scientist and engineers led by Shigeru Mizuno in 1988. They include; relation diagram, affinity diagram, tree diagram, the matrix diagram, the matrix data analysis, the process decision program chart and the arrow activity network diagram (Fonseca, Lima &Silva, 2015, p. 605).

This study aimed to identify these components of QM, measure their perceived level of implementation and develop a model incorporating these components to enable successful QM implementation.

Although it is necessary to implement all three components in order to succeed, managers must choose an approach suitable to the needs, objectives, functions and activities of the organisation (Ahmed & Hassan, 2003, p.799). The next section of this chapter discusses the different approaches organisations and managers adopt in order to implement QM in PSOs.

2.5 Approaches to Quality implementation in Public sector organisations

Organisations take different approaches to quality based on their requirements and also based on the culture of the organisation. It is believed that there is no single approach to the implementation of QM. As Ogbari & Borishade, (2015, p. 14) advise every organisation needs to develop a programme that is suited to its own needs, considering a multitude of factors, including product or service type, its stage of organisational development, the resources available, the organisational culture, and its customer requirements. Approach in the context of this study refers to the broad direction an organisation takes towards solving a problem based on an ideology, philosophy, belief or theoretical stance (Hofler, 1983, p.71). Westcott, (2014, p. 293) suggests four main approaches to QM implementation which are: The Guru Approach, The Business Excellence or Prize Approach, The Japanese Approach and The Exemplary Organisation approach. Another approach is The Certification Approach. In order to implement QM, an organisation can decide to follow the ideology of a quality guru or an organisation can aim to win a quality award such as the European Quality Award (EQA) and therefore adopted the European Foundation for Quality Management (EFQM) Excellence Model, which is a non-prescriptive framework. These approaches are not mutually exclusive as PSOs can decide to combine two or more approaches. This section presents different approaches to quality implementation. This section discusses these approaches for QM as suggested by Westcott (2014, p. 293). Discussing these approaches for QM implementation is important as one of the objectives of this research is to investigate which of these approach or approaches are been implemented by Nigerian PSOs in the space industry.

2.5.1   The Guru approach

A guru is regarded as a person with knowledge or expertise (Merriam-Webster Dictionary). A quality guru, therefore, is one who has developed a concept and approach in the area of business quality improvement that has had a significant and enduring effect in improving the quality of products and services (Neyestani, 2017, p.1). Many organisations have followed one or more quality gurus on their quality journey. This subsection will present a short review of the approaches of three significant quality gurus according to literature.

2.5.1.1 *W. Edwards Deming*:

Deming is often referred to as the 'Father of Quality' (Gorenflo & Moran, 2010, p.1) mostly because his work is considered to be by far the most transformational. Three main contributions to the area of quality are ascribed to Deming, two of which are; The Fourteen Points for

transformation of an organisation and the Seven Deadly Diseases of organisations which can constrain the transformation that the fourteen points can bring about (Aole, 2013, p. 47). As summarised by Metri (2006, p.37) "*the 14 points are intended to produce strong management commitment to quality, process design, and control through statistical tools, continuous search for and correction of quality problems, and a purchasing policy that emphasizes quality rather than cost. Further, these points are designed to encourage the removal of all barriers to employee participation and teamwork. It stresses effective communication between supervisors and employees, elimination of numerical goals and quotas for employees, and company-wide training and education. It also addresses the importance of product design and quality information systems*"

Deming is also recognised for his quality cycle, the Plan-Do-Check-Act (PDCA) cycle which Deming constantly referred to it as the Shewhart cycle according to his mentor in quality control – Walter Shewhart (Pietrzak & Paliszkiewicz, 2015, p.154). The PDCA cycle is primarily used as a framework for the quality improvement process. The PDCA cycle is meant to be an integral part of process management and is designed to be used as a dynamic model where the accomplishment of one turn of the cycle flows into the commencement of the next cycle. (Pavletić, Soković & Paliska, 2008, p. 197).

Studies show that different applications of the PDCA cycle have been implemented with positive results achieving the reduction of costs, as well as improving the quality of process and products. A study by Realyvásquez-Vargas, Arredondo-Soto, Carrillo-Gutiérrez & Ravelo, 2018, p. 10) showed the implementation of the PDCA cycle in a manufacturing company proved to be a useful method to decrease the number of defects of different process. In the public sector the Belgian Public Federal Service for Budget and Management Control has integrated the PDCA cycle into the internal control system within the organisation to help reduce management gaps, develop the organisation based on feedback received on activities and results and continually monitor the achievements of objectives to improve performance (European Commission Discussion paper, 2014, p.4). Also, Antony, Rodgers & Cudney, (2017, p.1408) investigated how PDCA cycle has been implemented as an improvement tool in the public sector. Their study shows how the PDCA cycle was implemented along with other quality improvement tools in the Israeli Traffic Police enforcement system to reduce the number of road traffic deaths in Israel from almost 7 per 100,000 head of population in 2004 to 3.6 in 2013.

According to Hellsten & Klefsjö, (2000, p.238) Deming's philosophy suggests that an integrated approach is required to implement the quality management practices in order to realise strategic quality objectives.

Another prominent quality guru is Joseph M. Juran,

2.5.1.2 Joseph M. Juran

Juran is believed to be an important contributor to the development of TQM, who viewed quality as "fitness for use" or fitness for customer. Juran believed that the customer is the one who defines quality and if an organisation wants to be successful, it must use the appropriate indicators to determine the needs of customers. He believed that quality is directly associated with the satisfaction of customers with the products or services (Neyestani, 2017a, p.9), therefore, his philosophy concentrated on both interior and outside clients, accepting that everybody was significant in the quality procedure beginning from the plan of the item through to the last item (De Foe, 2010, p. 97)

Juran introduced the Quality Trilogy: Quality Planning, Quality Control and Quality Management. According to Juran, these three basic quality-oriented processes are universal, interrelated and carried out by an unvarying sequence of activities (Juran, 1986, p.2).

Quality planning involves developing the products and processes required to meet customer's needs. It includes establishing quality goals, identifying customers and determining customer needs, developing product features that meet customers' needs, developing processes that can produce those products, establishing process controls, and transferring the plans to the operating forces; Quality control implies the use of statistical control methods using QM techniques and tools. And Quality improvement, means improvement should be continual, whereby, quality performance is raised to unprecedented levels (breakthrough) (Juran, 1986, p.3).

Juran also created ten requirements for supporting the idea of continuous quality improvement, which are; awareness training in connection with quality improvement for all employees, setting of clear attainable objectives in recognition of the need for improvement, reorganisation of internal structures to meet these objectives, establishment of training programmes in accordance with point three, creation of projects to tackle existing problems, monitoring and recording of progress achieved in tackling identified problems, appreciation and recognition of

staff successes and achievements, wide promotion (internally and externally) of all quality-related developmental success, statistical recording and analysis of improvements to inform future implementation and further development and a quality focus with a continual and upward momentum.

Juran's principles have been applied successfully in different contexts including the public sector, a case in point been the application of Juran's trilogy to an education setting to improve the quality of education and increase student satisfaction (Sok & Taib, 2012, p.51)

Philip Crosby is another prominent quality guru in literature.

2.5.1.4 Philip Crosby

Crosby is a well-known quality expert and inventor of the concept of 'Zero Defects', a quality improvement process grounded on the belief that efficient quality management must be based on a prevention-based system (Kehoe, 1997, p.10)

Every employee in the organisation needs to be completely clear as to what is required of them.

- *Prevention is better than cure – through strong leadership; a disciplined workforce will ideally anticipate problems before they arise.*
- *Zero defects means that any imperfection, whether in product or service, must be eliminated.*
- *Quality has to be measured in order to reach a guaranteed standard of conformity of products and consistency of service.*

Crosby's zero defects theory is been applied in both manufacturing and public service such as in healthcare where it was implemented in medical record management resulting in an increase in the accuracy of recovering medical records, increase in the accuracy of sorting discharge records, increase in the accuracy of medical record information processing, increase in the accuracy of binding discharge records and an increase in the accuracy of on-the-shelf medical records (Tang, Lv, Dai, Liang & Lu, 2014, p.254).

The three gurus discussed in this section all focus on different aspects of QM. PSOs can choose to adopt a particular guru's approach based on their organisation's needs. A PSO can choose to adopt Deming's approach if the organisation's focus is on a statistical process approach, the PSO can choose to adopt Juran's approach if the organisation's focus is on project management or choose to adopt Crosby's QM approach if the organisation's focus is on company-wide motivation (Dale, Bamford & Van der Wiele, 2016, p.45).

2.5.2 The Business Excellence or Prize approach

This approach makes use of self-assessment to implement QM, building on strengths in addition to addressing weaknesses or areas for improvements. The concept of a Prize Approach originated in Japan in 1951 when Japanese Union of Scientists and Engineers (JUSE) awarded the Deming Prize, this concept spread to the USA with the Malcolm Baldrige National Quality Award established in 1988 and to Europe with the European Quality Awards established in 1992. This concept has also spread to Africa, in Nigeria, this award is the Nigerian National Quality Award (NiNQA), officially launched in April 2017 (https://son.gov.ng/nigerian-quality-award).

According to Dahlgaard, Chen, Jang, Banegas and Dahlgaard-Park (2013, p.520), award programmes are usually supported by national bodies for the widespread adaption of the principles and methods of QM. The prizes awarded to organisations are usually based on an award assessment in line with a set of examination criteria. With the Malcolm Baldrige National Quality Award (MBNQA), the examination categories are: leadership, strategy, customers, workforce, measurement, analysis, and knowledge management, operations and results. (Baldrige Foundation, 2018; American Quality Society, 2018). The European Quality Award (EQA) is based on the European Foundation for Quality Management (EFQM) Excellence Model, which is a non-prescriptive framework based on nine criteria; Five of these are 'Enablers' and four are 'Results'. The enablers cover the process, structure and the means of an organisation in other words, what an organisation does and how it does it. The 'Results' criteria cover the aspects of performance in a broad way, that is, what an organisation achieves. 'Results' are caused by 'Enablers' and 'Enablers' are improved using feedback from 'Results (Nabitz, Klazinga & Walburg, 2000, p.192). The enablers of QM implementation include leadership, people, strategy and planning, partnership and resources and processes while the results include people, customer, society and key performance results.

According to the Standards Organisation of Nigeria (SON), the criteria for the Nigerian National Quality Award (NiNQA) award are based on a combination of the outcome of analysis of factory samples, market samples, sector-based index analysis and quality management process analysis using the following key performance indicators: Leadership intent towards quality operating environment & best practice adoption, Training, Consumer Awareness and Information & analysis (https://son.gov.ng/nigerian-quality-award).

In summary the Business excellence or Prize criteria approach consists of award models which offer a common framework for evaluating QM practices in organisations, be it in the manufacturing or service, private or public sector. Award models provide a framework for the identification of components of QM to be implemented, contributing to the overall implementation of QM and improvement in the performance of the organisation. Quality award models also provide organisations with a means to self-assess using a set of international standards to identify their strengths and weaknesses in the practice of QM. Although some authors have reported the drawbacks of the scoring system which the prize approach uses, emphasising that fixation with the scoring system is not in the interest of developing improvement strategies (Conti, 1997, p.59; Dale, Zairi, Van der Wiele & Williams, 2000, p.8) Other authors like Al-Majali & Almhirat, (2017, p. 595) believe that self-assessment is a significant tool for continuous, systematic improvement in an organisation. The use of this approach broadens the quality concept into a business concept which makes use of an assessment approach rather than an audit approach in order to achieve excellence, building on strengths in addition to addressing weaknesses or areas for improvement.

2.5.3 The Japanese Approach

The third approach identified by Wescott (2014, p.293) refers to working philosophies or methods in Japan. It includes concepts and philosophies such as Theory Z and Kaizen.

Theory Z- this theory was developed by Willian Ouchi. Theory Z is a managing style that focuses on a strong company philosophy, distinct corporate culture, long range staff development and consensus decision making. The desire, under this theory, is to develop a work force which has more loyalty towards staying with the company and be permanent in their career. This theory presumes that workers tend to build a happy and intimate working relationship with those that they work for and work with. Employees highly expect that they will be supported by the company. They value a working environment in which such things as family culture, tradition, and social institutions are regarded as equally important as work itself (Aithal & Kumar, 2016, p.803)

Kaizen- Kaizen is a Japanese term for the concept of continuous improvement. 'Kai', which means continuous and 'zen' which means improvement. Some translate 'Kai' to mean change and 'zen' to mean good, or for the better (Palmer, 2001, p.55). As the name implies, Kaizen is a Japanese philosophy that it relies on the idea that there is no end to making a process better. When applied to the workplace, it means continual improvement that involves managers and

workers alike (Palmer, 2001, p.55). According to Ohno, Ohno & Uesu (2009, p.9). Kaizen is an umbrella concept that includes a series of Japanese Management Systems, covering production planning activities, human resource policies and practices, organisational and leadership approaches. Kaizen is process-oriented, focusing on discipline, time management, skill development, participation and involvement, morale and communication. According to Zailani, Shaharudin, & Saw, (2015, p.188) the uniqueness of kaizen, is in its never-ending improvement process and one that emphasises communication and trust between workers and management towards productivity and quality improvements. Ohno et. al (2009, p. 3) compiled a number of related components belonging to the kaizen toolkit which may be adopted for quality improvements; 5S, Suggestion System, Quality Control Circles (QCC) or Quality Circle (QC), Total Quality Control (TQC), Total Quality Management (TQM), Toyota Production System (TPS), Just-In-Time (JIT) System, Kamban System. This study investigated to determine if some of these components are implemented in Nigerian PSOs in the space industry. A brief explanation of some of these kaizen components can will be found in Appendix 1.

In summary the Japanese approach has been very successful in Japanese industry and many aspects of it are being used very successfully in Western organisations. However, public sector organisations in countries like Nigeria should be cautious and select specific approaches which relate to their specific needs rather than try to impose a foreign culture which took many years to evolve (Ogbari & Borishade, 2015, p. 14)

2.5.4 The Certification Approach

The idea of quality certification was created so as to have a uniform standard or benchmark and furthermore a free evaluation or audit against the standard (Hellman & Yeng, 2013, p.111). Certification is the provision by an independent body of written assurance (a certificate) that the product, service or system in question meets specific requirements (International Standards Organization (ISO), 2018). Certification is a useful tool to add credibility by demonstrating that a product or service meets the expectations of your customers. For some industries, certification is a legal or contractual requirement.

To obtain product, service or system certification, an independent organisation assesses or tests a product against a standard or specification. Examples of organisations which provide this function include the British Standards Institute (BSI) in the United Kingdom and the Standards Organisation on Nigeria. There are also specialised organisations like the Food and Drugs

Administration (FDA) in the USA which certifies and controls food and drug products, which are not only produced in the USA, but are manufactured abroad for consumption in the USA. In Nigeria a similar function is supplied by the National Food and Drug Administration and Control Agency (NAFDAC).

In system certification, an independent organisation assesses or audits the quality system in an organisation against a standard or specification. The recognised standard for quality systems is ISO 9000 family developed by the International Standards Organization (ISO). The ISO 9000 family addresses various aspects of quality management and contains some of ISO's best known standards. The standards provide guidance and tools for organisations who want to ensure that their products and services consistently meet customer's requirements, and that quality is consistently improved. The ISO 9001:2015 sets out the criteria for a quality management system and is the only standard in the family that can be certified to. This standard is based on seven quality management principles. They include: Customer focus, Leadership, People involvement, Process approach, Improvement, Evidence-based decision making and Relationship management. These principles have been identified as a framework towards improved performance of an organisation and are aimed at helping organisations achieve sustained success.

The ISO 9001 is nationally recognised in Nigeria and widely used by public and private sector organisations. The Standard Organisation of Nigeria (SON); a government body, carries out third party ISO certifications for organisations in Nigeria (https://son.gov.ng/about-us) and just recently, some public organisations including the Nigerian Communication Satellite, National Communications Commission (NCC) and Nigerian Postal Services were given directives to get ISO certifications (Daily Trust, 2019).

2.5.5. The Exemplary Organisation Approach

In this approach individuals or teams visit organisations that have taken a leadership role in TQM and determine their processes and reasons for success. They then integrate these ideas with their own ideas to develop an organisational model adapted for their specific organization. This approach has been further developed into the term "Benchmarking" which came from work carried out by the Xerox Corporation in the USA becoming part of best business practice. Elmuti and Kathawala (1997, p.229) define benchmarking as *"the process of identifying the highest standards of excellence for products, services, or processes, and then making the improvements necessary to reach those standards, commonly called "best practices".*

Another popular approach is Lean Six Sigma (LSS). Lean and Six Sigma are two popular and dominant process excellence methodologies widely adopted by a number of manufacturing and service organizations for achieving process efficiency and effectiveness, which results in superior customer service experience, superior product and service quality, enhanced business profitability, and sustainable competitive advantage (Anthony, Rodgers & Cudney, 2017, p. 1403).

Lean is an adaptation of the Toyota Production System, which seeks to reduce or eliminate waste in all operational processes. Six Sigma is a management approach that seeks to maximize profits by systematically applying scientific principles to reduce variation and thus eliminate defects in product and service. Lean and Six Sigma have been increasingly applied together in public sector organisations. A few case studies have been identified by authors such as Antony et. al, (2017, p. 1405) and Maleyeff, (2014, p. 96).

Summary

In summary, all the approaches discussed in this section are modelled on the three components of quality management; principles, tools and techniques. Approaches, Principles, Techniques and Tools have also been distinguished as follows; Approach- refers to the broad direction an organisation takes towards solving a problem based on an ideology or theoretical stance. Principle- Guiding statements and beliefs based on the approach. Principles are the foundation upon which the organisation builds its quality culture, such as management commitment, leadership and employee focus.

Technique- refers to skilled actions or activities that organisations perform in order to obtain set objectives. Techniques are implementational. It can be concluded that techniques are the actions organisations undertake in implementing QM in order to obtain optimal results. Examples are Quality circles and Performance measurement.

Tools- refers to devices which sometimes have a statistical basis to support decision making or facilitate analysis of data examples are histograms and control charts

The approaches discussed in this study are not mutually exclusive, two or more approaches can be combined. For example, organisations which adopt the certification approach, may also use the business excellence model, benchmark against best in class organisations, may make use of some Japanese practices and may also make use of one or more of the quality gurus' philosophies. Quality Management theory does not prescribe any single best practice and

organisations are encouraged to tailor the application of the principles to their individual circumstances (Stringham, 2004, p.185; Mansour & Jakka, 2013, p. 101). Kehoe (1997, p.3) postulates that every organisation's journey in QM is unique, however, most organisations progress successively through the following three stages of development: a systems orientation stage, an improvement orientation stage and finally a prevention orientation stage. For each of these stages, different approaches, tools, techniques are applicable. At the systems orientation stage, indicating the starting point of the quality journey, the emphasis is usually on implementing a system and trying to interest people in quality. At this stage the management style echoes an awareness of QM, teamwork is restricted to specific problems, customers are defined and their requirements are determined, techniques such as acceptance sampling are used to sort out conforming products from non-conforming products and quality systems such as ISO 9001: 2015 are implemented. At the improvement Orientation stage, considerable progress is made with respect to the culture and deployment of tools and techniques. At this stage the management style reflects involvement in QM activities, teamwork involves the establishment of improvement teams, processes are improved to exceed customer requirements, leading to improved customer service, self-assessment tools are deployed, and improvement tools including the seven quality control tools are implemented. At the final stage, the prevention orientation stage, a mature stage of quality development is attained, where emphasis is on defect prevention and sustainability. At this stage the management style reflects commitment to QM and its sustainability, organisational structure is team-based, customer relationships are developed and customer loyalty develops, people are rewarded and recognized for appropriate behaviour and values, advanced prevention-based quality tools and methodologies such as benchmarking, Failure Modes and Effect Analysis (FMEA), reliability analysis, design of experiments, the seven management tools and total preventative maintenance are deployed and external recognition is received through winning business excellence awards.

After discussing the different approaches PSOs can utilise in implementing QM, the next section of this chapter discusses implementation of QM using some of these approaches in Nigeria and specifically in the Nigerian public sector.

2.6 Quality management implementation in Nigeria

Studies show that many organisations in Nigeria are aware of QM, but that the level of implementation has been very low (Akinola, Akinradewo & Olatunji, 2012, p.224). Okpala

(2012, p.364) contends that QM was first mainly practiced in Nigeria by multinationals that understood the concept but was first notably implemented locally with success by Zenith International Bank Plc which began operations in 1990. Since the successful implementation in the banking sector, more organisations from both the manufacturing and service industries have started implementation of QM (Orumwense, 2014, p. 1).

A review of literature shows that different approaches to QM are used for implementation of QM in Nigeria (see Appendix 2). Forty-two studies were reviewed. The review process was developed using a set of criteria for reviewing appropriate literature on the implementation of QM in Nigeria. The criteria are search themes, study context, study methodology, scope of search, databases, and time frame. Databases utilised in the review process included Taylor & Francis, Emerald, Researchgate, Sage, Springer, Academia, Wiley, ProQuest, Science Direct and EBSCO host. Also, focus of the search time frame was on studies published between 2009 and 2018.

Table 2.1: Criteria for literature review to identify studies of QM implementation in Nigeria (Source: The Author)

Search Area	Area of focus
Themes	Quality Management; including TQM, Quality Control/Quality Assurance, Lean Six Sigma
	Quality management factors, critical success factors, key success factors, barriers and challenges to QM implementation
Study context	Nigeria
Study methodology	Case study, Survey, Literature review and Systematic literature review
	Interviews, Questionnaires and Discussions
Scope of search	Journal topic, abstract and keywords
Databases	Taylor & Francis, Emerald, Researchgate, Sage, Springer, Academia, Wiley, ProQuest, Science Direct and EBSCOhost
	* Search excluded sources inaccessible by the University of Portsmouth
Review Time frame	2009-2019

The results of the review (Appendix 2) indicated that are more studies have been done on the private manufacturing, construction and service sector with a few studies carried out on public sector organisations. The analysis shows 14 studies were on the manufacturing sector, 6 studies were on the construction sector, 10 studies were on the service sector (banking, consulting and accounting), 2 studies on small and medium organisations (manufacturing and construction), 1 mixed sector study and 9 studies were conducted on the public sector (education, healthcare and government agency). These studies were carried out using QM implementation approaches including, TQM, Lean management, Quality control, Quality assurance, Six-sigma and Lean six-sigma. The analysis shows that TQM, was the most implemented QM approach in the reviewed studies.

These studies indicate that QM is an effective management philosophy which can be successfully implemented within organisations in Nigeria using most of the QM approach discussed. Successful implementation has been shown to have an impact on bottom-line results but if it is to work, it must have the long-term devotion and the actions made to improve quality must be continuous (Orumwense, 2014, p.3). However, the review also indicated the there is an absence of literature on QM implementation in Nigerian PSOs in the space industry raising the need for an investigation into the implementation of QM initiatives in this sector. The review does reveal studies on QM implementation in Nigerian PSOs. Thus, the next section of this chapter discusses QM in the Nigerian Public sector.

2.7 Quality Management in Nigerian Public sector

Quality Management implementation is believed to be part of the strategy carried out by many countries to deviate from the traditional bureaucratic management towards a more entrepreneurial New Public Management, where public sector organisations are embracing some quality initiatives in order to become more efficient (Karyotakis & Moustakis, 2014, p. 30). The Nigerian government, like many other governments decided to encourage the implementation of QM in Nigerian public organisations, with hopes that it will have the same effect in their organisations as it has had in the private sector (Omisore, 2013, p. 18; Ibietan, 2013, p. 53). However due to QM originating in the manufacturing sector and predominant use in the private sector, there are some arguments against the use of QM techniques in public sector organisations. Maram (2008, p.206) argue that there are special characteristics of the public sector which make implementation of such management techniques inappropriate or, at least, very difficult. Private organisations are driven by market forces making QM

implementation a straightforward technical procedure within the sector which is not the case for the public sector (Parker, Waller, & Xu, 2013, p.654). Tyasti & Caraka (2017, p.3286) explain that implementing QM initiatives in PSOs can be more problematic than in private sector organisations due to the difference in the system structure, customers, employee perception, and culture of PSOs. For example, QM depends on a strong organisation culture characterized by employee empowerment and teamwork, however, several government owned organisations are hierarchical, bureaucratic organisations, in which employee empowerment and teamwork are not core values. Therefore, the implementation of QM in these types of organisations requires a considerable effort towards transforming the fundamental values and culture, which is a major task (Maram, 2008, p.206)

Another argument put forward by Fountain, (2001, p.67) focuses on the social and political pressures on public sector agencies. She states that "*Political bureaucrats have an obligation to do more than satisfy customers. They must identify and aggregate preferences in ways that sustain political legitimacy and minimize political inequality*". More so, PSOs operate with a fixed budget and consumer groups are in competition with each other for scarce resources, therefore consumer satisfaction cannot be the only, or major, dimension in performance measurement in the public sector and must be handled with significant consideration.

The arguments in support of the applicability of QM to the public sector is that government is itself, a service-driven industry and hence, would respond well to its philosophy. Dean and Helms, (1996, p. 50) argued that the advantages of using QM in government are similar to those in the private industry and include lowering operational costs, improving public services, increasing employee morale, and increasing quality and productivity. At a federal level, the application of QM could eventually save the government a lot of money.

Al-Ibrahim, (2014, p.124) supports that QM can indeed be applied in the public sector by stating that quality in the delivery of goods or services is now accepted as a critical aspect of business management in all fields since it is realised that only by satisfying its customers can an organisation hope to retain its customer base and indeed expand it for the future. It should be understood that it is not just in commercial contexts that the concept has meaning because in those institutions providing services to the public, the issue of delivering quality is equally important. He further states that the focus on providing quality of service has gradually spread to areas outside of the manufacturing sectors. For instance, in the United Kingdom, service

quality standards are now frequently used in the delivery of social services as a means of controlling quality of care for different types of clients, such as care for the elderly.

Quality management (QM) plays an important role in public organisations' efforts to create better access to, and effectiveness of, specific services. When transferring QM models from market-based firms to public services provided by public organisations, several basic contrasts and even contradictions must be addressed. An example of this is illustrated by Elg, Wihlborg & O¨rnerheim (2017, p. 381) stating that, to a private company, an individual is a customer; while to a public organisation, an individual can have several different roles, for example, student, patient, client, or taxpayer. These roles are interconnected with the duties, rights, and expectations related to citizenship. The roles also imply involvement of the individual. The student studies, the patient rehabilitates, the client in social services fulfils duties to get benefits, and the taxpayer pays his or her taxes and make these and other services available. The production of public services is therefore not one-sided and delivered to the individual, but they are formed in partnership that extends the meanings and potential of QM. Thus, there is a need to elaborate on, and clarify, the conceptualisation of public services in order to develop the practice of QM in public services.

Another concern has to do with the possibility of QM forcing uniformity upon public services. There is the notion that public services may act mechanically in relation to individual consumers' needs. To prevent this Ferreira & Diniz, (2004, p.490) suggested that different forms of behaviour must be adopted according to the people in question so that their needs are fully provided for. QM applied to public services must tackle people's needs individually to ensure they are satisfied. Stringham (2004, p.184) also believes that QM can have a valuable role to play in government, but only if it is considerably revised to suit the public service's unique characteristics. Ejumodu (2009, p.145) further contends that QM implementation in the Nigerian public sector requires a comprehensive and pragmatic non-political administrative restructuring, re-engineering and re-organisation to meet the changing demands of the sector. This section will therefore discuss how the Nigerian government have embarked on encouraging public organisations in the country to embrace initiatives which will cut cost, increase efficiency and productivity and serve the Nigerian citizens better.

In the quest for efficiency, cost containment and quality improvement, both developed and developing countries have embarked on public sector management reforms. Nigeria is one among many countries which embarked on comprehensive reforms aimed at improving the

quality of life of their citizens and creating new government machineries to establish efficient and effective management systems. (United Nations Economic Commission for Africa, 2014, p.23). Most of the recent reforms have been done under the influence of the New Public Management (NPM).

In the 1980s and 1990s, there was a shift from the traditional/old public administration to public management, pushing the state towards 'managerialism'. The traditional public administration was based on the principles of bureaucratic hierarchy, centralized control and self-sufficiency (Economic Commission for Africa, 2014, p. 8; Robinson, 2015, p. 5). This "command and control" approach to public administration was used by countries under colonial rule and maintained even after independence in many Commonwealth countries (Robinson, 2015, p. 5). By the 1970s, this model of public administration was seen as no longer suitable and faced a lot of criticism. Some of these criticisms included: over bloated government ensuing in the overconsumption of limited resources; government involvement in too many activities; prevalent bureaucracy; high rates of inflation; lack of differentiation amongst strategy and governance; the absence of rational decision making; and indifference to citizens' satisfaction. The model was also disapproved as being inefficient, encouraging corruption, lacking accountability and inflexibility. These harsh criticisms helped in the rapid emergence of a new model, New Public Management (Abdelfatah, 2012, p.2).

New Public Management (NPM) refers to a series of novel approaches to public administration and management that emerged in a number of OECD countries in the 1980s (Robinson, 2015, p. 7). Mongkol (2011, p.36) defined NPM as "*a set of particular management approaches and techniques which are mainly borrowed from the private sector and applied in the public sector. NPM is intended to improve the quality of public services, save public expenditure, improve the efficiency of governmental operations and make policy implementation more effective.*"

The NPM model has been used in assisting many developed countries such as the United Kingdom, New Zealand and Australia in overcoming the problems generated by the old public management model. Some benefits of using the NPM model as summarised by Mongkol (2011: p.36) include; improving efficiency and creating value for money through a concentration on auditing and performance management; encouraging the government to focus on efficiently producing quality public goods and services, reducing the size of the public sector, and decentralising management

The NPM was characterised by cutting red tape, putting customers first, empowering employees to get the right results from work, and returning to the fundamentals and creating quality government (Al Gore cited in Abdelfatah, 2012, p.3).

Despite the success of the NPM model in assisting many developed countries in overcoming the problems generated by the old public management model, critics are of the opinion that NPM-oriented reforms would fail if applied in developing countries. (Abdelfatah, 2012, p.3). Some of these criticisms as noted by Mongkol, (2011, p. 37) are, first that, despite the fact that the NPM model aims for transparency and the eradication of corruption in the public sector, it tends to create the opposite effect, leading instead to higher rate of corruption. This is because NPM provides greater freedom to public managers then they are used to: together with lower levels of supervision, this can create a fertile climate for corruption. Second, due to the long history of centralisation in the public sector, there is strong resistance to the decentralization in developing countries. Third, the absence of the rule of law in developing countries would led to non-enforcement of contracts contracted out to the private sector. However, the opinion that the NPM model should not be viewed as a 'One size fit all' concept. This is because the NPM reforms have succeeded in some organisations and failed in others. It is recommended that the NPM model should be considered as a number of separate techniques, not as a package, in order to help developing countries adopt techniques that suit their needs and their local conditions (Abdelfatah, 2012, p.7)

The Nigerian government as earlier mentioned is one of the developing countries which has embraced the NPM model and has attempted for many years to reform her public sector by instituting commissions and committees both in the colonial and postcolonial periods. In 1999 after the successful transition from military to democratic rule, the poor performance of organisations within the Nigerian public sector prompted a series of reforms across the public sector. These reforms did not only take effect in the civil service alone but had an effect on the larger public sector as well (Ibietan, 2013, p. 53). Some reform initiatives made by the government since 1999 include: Pay Reform, Postal Services Reforms, Public Financial Management Reforms, Anti-Corruption Reforms, National Statistical System Reforms, Banking Reforms, Capital Market Reforms and Privatisation of Government Enterprises (Nigerian Bureau of Public Service Reforms (BPSR), 2017; Omisore, 2013, p. 18). New techniques in management, particularly those that worked in the private sector such as: Total Quality Management (TQM), Performance management, Citizen's Charter which is known as Service Compact (SERVICOM) Charter in Nigeria, as recommended by the NPM model, have

also been adopted (Fagbemi, 2017). SERVICOM and Performance management reforms by the Nigerian government are briefly discussed below;

The Service Compact (SERVICOM) Charter was established in Nigeria in 2004. This charter was introduced after a consistent pattern of poor services and failure to meet the expectations of the Nigerian citizens was identified in Nigerian public service organisations. Public services were mainly inaccessible and of poor quality. There was a lack of indicators for government ministers to monitor the outcome of their policy pledges or hold anyone accountable for failure of service delivery. This brought about the establishment of SERVICOM with the broad objective to: provide quality service to the people; set out the entitlement of the citizens; ensure good leadership; educate the citizens (customers) on their rights; empower public officers to be alert to their responsibilities in providing improved, efficient, timely, and transparent service (Nigerian Bureau of Public Service Reforms, 2017)

For Performance Management reforms, an integrated Performance Management System (PMS) was inaugurated in 2012 to improve transparency of governance, improve accountability of managers, enhance professionalism, reduce the cost of governance and increase efficiency in delivery of public goods and services. The PMS was implemented by the Nigerian government to replace the Annual Performance Evaluation Report (APER); a performance appraisal tool which was used to measure individual performance of public sector workers but was deemed unreliable and inadequate for performance management and a continuous improvement tool, due to the lack of integrity of its output (Nigerian Bureau of Public Service Reforms, 2017)

Some studies (Emeje, Ekere, Olayemi, Isimi & Gamaniel, 2019, p.2; Akpan, Amade, Ukwuoma & Nwoko-Omere, 2014, p.1) on public organisations in Nigeria indicate that public managers have introduced many QM initiatives whose benefits have been said to include accountability to customers and high performance, restructuring of bureaucratic agencies, redefining organisational missions, streamlining agency processes and decentralising decision making.

Although it has been proven in literature that public organisations can and are implementing QM initiatives, this has not been accomplished without challenges (Emeje, Ekere, Olayemi, Isimi & Gamaniel, 2019, p.1). Radnor (2010, p. 72) therefore advises managers of public organisations to select approaches that are suitable with their structure and policies. Managers must decide and comprehend the important factors which are fundamental for continuous

improvement to prevent disappointment in the implementation process. Thus, the next section in this chapter describes the QM factors which are critical for the successful implementation of QM.

2.8 **Critical Success factors for Quality Management Implementation**

Numerous researches and publications affirm that for organisations to implement QM, it requires certain factors that if managed correctly will ensure an effective implementation process (Oakland, 2003, p.36; Brotherton & Shaw, 1996, p.11; Fryer, Anthony & Douglas (2007, p.503).

Critical Success factors for QM vary among different researchers across the globe. There exist different terminologies in the context of QM factors. Terms such as critical success factors (Fryer, Anthony & Douglas 2007) and key success factors (Pimentel & Major, 2016, p.1000; Balzarova, Bamber, McCambridge & Sharp, 2004, p.390) are used interchangeably. Some authors also make use others words instead of factors, Sadikoglu & Olcay, (2014, p.4), Al-Qahtani, Alshehri, & Abd.Aziz, (2015, p.120) and Bajaj, Ruchi Garg, & Sethi, (2018, p.135) called them practices; Diamandescu (2016, p.672) identifies them as principles; Al-Kassem, In'airat and Al Bakri (2013, p.43) describe them as elements. For the purpose of this study, these success factors will be referred to as critical success factors (CSFs)

Identifying the critical success factors of QM implementation is necessary and as this is considered critical to its success. According to Leidecker and Bruno (1984, cited by Frączkiewicz-Wronka, Szołtysek & Kotas, 2012, p.232) critical factors are the characteristics, conditions and variables responsible for an organisation's success.

Oakland (2003, p.36) also defines these success factors of QM as '*the critical areas which organisations must accomplish to achieve its mission by examination and categorization of their impacts"*

Alternatively, it can be said that the success factors of QM implementation are those vital few requirements that must be present in an organisation to be able to attain its vision, and to be guided towards its vision (Wali, Deshmukh & Gupta, 2003, p.4). Brotherton and Shaw (1996, p.115) emphasized that these success factors are not objectives but are the actions and processes that can be controlled by management to achieve the organisation's goals. Hence, proper management of such factors will result in improved quality and better performance for the organisation. Boynton and Zmud (1984, p.17) posit that success factors "*are those few things*

that must go well to ensure success". Fryer, Anthony & Douglas (2007, p.503) agree with this definition as it is more universal, applicable to both the public and private sectors and not restricted to a particular type of project. They also indicate that the importance of defining the success factors of QM for implementation is to increase the success rate, reduce costs, and prevent disillusionment with continuous improvement programs.

A significant number of literatures on QM success factors is available and have been adopted by both public, manufacturing and service sectors. However, it is pertinent to note that there is no specific concurrence on the number of factors that constitute QM success factors, as factors tend to vary across authors and researchers. The use of different terminologies is also believed to contribute to the difficulty of comparing sets of factors since the terms; components, elements, criteria, principles and factors appear to be utilized reciprocally (Yeng, Jusoh, & Ishak, 2018, p.2).

Al-Qahtani et, al, (2015, p.124) in their study to investigate the impact of QM factors on organisational performance in Pakistan, concluded that customer satisfaction and quality performance of products and services are factors which can be enhanced by implementing different quality initiatives at organisations. Sila and Ebrahimpour, (2005, p.1123) identified customer focus, leadership, supplier relationship, community relations, planning, and benchmarking.

Talib & Rahman (2010, p.375) identified nine critical factors of quality management; top-management commitment, customer focus, training and education, continuous improvement and innovation, supplier management, employee involvement, employee encouragement, benchmarking and quality information and performance. A study by Shibani, Soetanto & Ganjia (2010, p.306) on TQM implementation in Libyan construction organisations, identified five critical factors: management commitment, communication, work environment and culture, employee involvement and recognition, and employees training and development.
Zakuan, Muniandy, Saman, Ariff, Sulaiman and Jalil (2012, p.31) proposed a conceptual model of factors of QM implementation in higher education institutions. The factors applied in their model included: management commitment, communication, customer focus, employee involvement, training, continuous improvement and teamwork.

All these studies have produced factors which are all critical to the success of QM implementation and the common conclusion from these studies is that each organisation has a

set of factors to which it must focus on and almost certainly, an effective QM implementation requires the integration of the three components of QM; principles, techniques and tools.

Different researchers have used different methods to identify success factors for QM implementation, such as questionnaires, interviews and literature review of previous studies. In this research, a review of literature about success factors of QM implementation was done to develop a group of QM implementation success factors which were investigated using questionnaires. A review of 33 studies was carried out to identify critical success factors of QM implementation across the public and private sectors (see Appendix 3).

The review was concentrated on studies focused on factors of QM implementation in the context of public service, public manufacturing and general manufacturing sectors. These studies were conducted using QM approaches that include Quality improvement, TQM, Six-sigma, Lean, Lean six sigma, ISO 9001 and Continuous Improvement. Databases and the search time frame remained the same as explained in section 2.6. Table 2.2 below presents the review criteria.

Table 2.2 Criteria for literature review to identify factors for QM implementation (Source: The Author)

Search Area	Area of focus
Search themes	Quality Management; including TQM, Quality Control/Quality Assurance, Lean Six Sigma, Lean, ISO 9001 and Continuous Improvement
	Quality management implementation factors, critical success factors, key success factors.
Study methodology	Case study, Survey, Literature review and Systematic literature review
	Interviews, Questionnaires and Discussions
Type of Articles	Journal and Conference papers
Scope of search	Article topic, abstract and keywords
Databases	Taylor & Francis, Emerald, Researchgate, Sage, Springer, Academia, Wiley, ProQuest, Science Direct and EBSCOhost * Search excluded sources inaccessible by the University of Portsmouth
Review Time frame	2009-2018

The analysis of the reviewed studies (see Appendix 3) shows twenty success factors for QM implementation defined across the 33 reviewed studies (see Table 2.3 below).

Table 2.3: QM implementation success factors from literature (source: The Author)

	QM Implementation success factors	Frequency	Rank
1	Management commitment and leadership	30	1
2	Training and Education	25	2
3	Customer Focus	22	3
4	Employee involvement	21	4
5	Continuous improvement	21	5
6	Organisational Culture	18	6
7	Communication	15	7
8	Teamwork	14	8
9	Process management	14	8
10	Performance measurement system	11	9
11	Partnership with supplier	10	10
12	Resource/Funds	9	11
13	Benchmarking	8	12
14	Reward and Recognition	7	13
15	Information and data analysis	7	13
16	Organisational structure	3	14
17	Strategic planning/ policy	3	14
18	Organisational infrastructure	1	15
19	Work environment	1	15
20	Vision and Plan statement	1	15

Table 2.3 presents the results of the systematic review of 33 selected studies and researches covering the topics of QM implementation success factors. Studies (Karuppusami & Gandhinathan, 2006, p.381; Talib, Rahman & Qureshi, 2010) show that implementation difficulties exist when organisations try to operationalize a large number of CSFs. Therefore, this study analysed and sorted the CSFs in descending order according to the frequency of occurrences within the reviewed literature using Pareto analysis. Pareto Analysis is a statistical technique in decision making that is used for the selection of a limited number of tasks that

produce significant overall effect (Talib, Rahman & Qureshi, 2010, p.155). Pareto analysis uses the Pareto Principle, also known as the 80/20 rule, a concept indicative that the majority of results are often derived from a minority of inputs. The ratio does not have to be 80% and 20% exactly, as it is not mathematically fixed, but used as a rule of thumb. It could be a ratio of 87 % and 13% or 70% and 30% (Dunford, Su, Tamang & Wintour, 2014, p.141). The results of a Pareto analysis are typically represented through a Pareto chart. The chart represents the various factors under consideration in ranked order. The presentation of this chart is in the form of a bar graph in descending order and helps to predict easily which factors are vital few by providing a clear indicator through superimposing a line graph that cuts an 80 percent or equivalent cumulative percentage (see figure below).
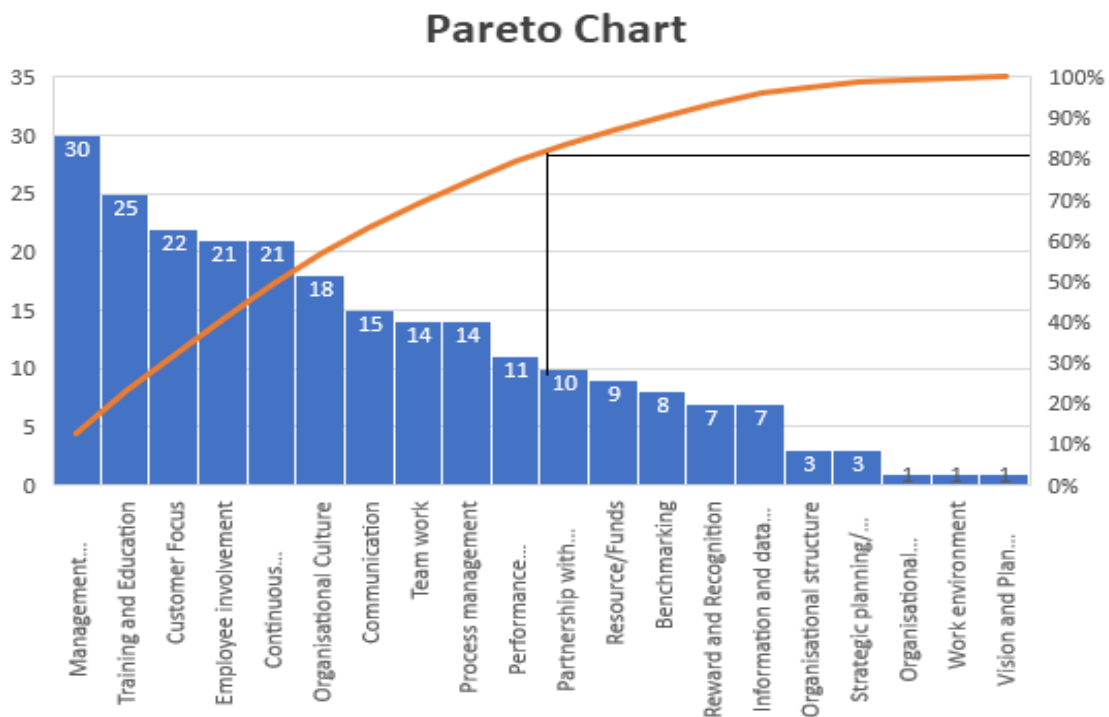
Figure 2.1 Pareto chart of Critical success factors of QM

The total frequency of occurrences of these 20 CSFs identified from the literature was 241. After Pareto analysis of these 20 CSFs, 10 CSFs accounted for 79% of the occurrences. The remaining 10 CSFs accounted for only 21% frequency of occurrences. This suggested that 10 of the identified CSFs in this study are frequently used for QM implementation in public sector manufacturing organisations and these 10 were therefore used in this research. The 10 factors were; management commitment and leadership; training and education; customer focus;

employee involvement; continuous improvement; organisational culture; communication; teamwork and process management and performance measurement system. These ten factors are discussed below;

2.8.1 **Management commitment** - Top management commitment and leadership has been identified as the most important success factor among all the factors for successful QM implementation (Kundu & Manohar, 2012 p.306; Talib, Rahman and Qureshi, 2010, p.157) The fundamental reason for the importance of this factor is summarised by Oakland (1997, p.31) as follows, '*to be successful in promoting business effectiveness and efficiency, QM must be truly organisation-wide; it must start at the top with the chief executive.*' The success of a quality improvement program depends much on the top management commitment. If the managers or directors of organisations do not recognise and accept their responsibilities for the initiation and operation of QM, then changes will not happen. This involves communicating a vision for the future that is clear and convincing and also providing a strategic leadership (Shibani, Soetanto & Ganjian, 2010, p.302). The role of managers in promoting QM implementation includes allocation of resources required for implementation and effective operation of the quality system; rewarding employees for participation in continuous quality improvement; minimize problems of communication between organisational levels (Lazarus, Nyuke & Gasva 2015, p.91). According to Diamandescu, (2016, p.672) applying this factor ensures compliance with the needs of all stakeholders; enables the development of the objectives that will ensure increased competitiveness of organisation and thereby will establish a clear vision of the organisation's future; providing the necessary resources for the training and the freedom to act with responsibility and efficiency for the staff; build confidence and eliminate fear, by encouraging and recognising personal contributions.

2.8.2 **Customer focus** - Foster (2010, p.73) defines this factor as a proactive approach to satisfying customer needs that is based on gathering data about customers to learn their needs and preferences and then providing products and services that satisfy those changing needs and preferences. Gherbal, Shibani, Saidani & Sagoo, 2012, p.81) also define customer focus as the degree to which an organisation continuously satisfies customer needs. To achieve this, it is necessary, first, to identify external customers and internal customers, then the requirements, the needs and the expectations are determined and translated into specifications based on which the products and services

are provided with certain quality characteristics. Mehra, Hoffman & Sirias (2001, p.860) identified that having a profound knowledge of customer expectations is an important aspect of QM because every activity is driven by this knowledge. Organisations depend on their customers and therefore should understand current and future customer needs, they should meet customer requirements and strive to exceed customer expectations (Lazarus, Nyuke & Gasva 2015, p.91).

2.8.3 **Employee Involvement** - Employee involvement is a process for enabling workers to take part in decision-making and improvement activities proper to their levels in the organisation (Zakuan, et.al, 2012, p.28). It is a psychological method to develop confidence between individuals in the organisation and urge them to make decisions and solve problems with one another. Gherbal et.al, (2012, p.82) contends that the successful implementation of QM, requires a committed and skilled workforce to fully participate in the activities carried out to improve quality. To achieve this, all employees at all levels within the organisation should be encouraged to take responsibility and communicate effectively toward improving the quality at all stages Employee involvement instils a better understanding of importance of the product or service quality in employees and makes them committed to the quality improvement. Engagement of employees in quality related issues can increase the understanding of organisational policies and augment employee's understanding of problems and resolving these issues at their level (Khan, 2011, p.159). Recognition and reward for employees have also been cited as powerful triggers for wanted accomplishment and employee fulfilment (Ali & Ahmed, 2009, p.271) Recognition is the process whereby management acknowledges employees' outstanding performance. Rewards can be awarded in numerous ways yet should be significant and merited (Gohari, Kamkar, Hosseinipour & Zohoori, 2013, p.572). This is essential as people need to be in a winning role. Recognition and rewards are key forms of positive reinforcement and for letting people know they are valuable members of the organisation. An organisation must use recognition and reward not to force people to do things excellently but to encourage them to do so (Bounabri et.al, 2013, p.44). This practice would promote overall performance and especially contribute to social performance through employee satisfaction.

2.8.4 **Training and Education**- The training of all the employees is considered the fundamental building block for successful implementation of QM. Studies show that there is a link between training and organisational performance (Shibani, 2010, p.302)

Training in quality-related concepts and tools is regarded as the most important factor in actually increasing employees' capacity to do their job, finding out and solving problems, releasing the full potential of workers and continuously improving quality. Furthermore, training is usually related to changes. These changes include the variety of the business environment, improvement of organisational performance, higher requirements of operation and the level of the employees. To achieve the desired skills, all management personnel, supervisors, and employees should accept quality education and training. Training helps employees at all levels to understand the quality management system and their roles and responsibilities within it. Training must be viewed as a continuous process (Jamali, Ebrahim & Abbaszadeh, 2010, p.113).

2.8.5 **Communication**- This is considered a very important factor to an organisation's action process. Effective communication can inspire, prevent misunderstandings and reduces the costs of quality by evading mistakes (Talib & Rahman, 2010, p.261). Effective communication is essential to translate the vision and plans for the organisation from top management to all employees, yet some managers find it tough to tell others about their plans in a way that will be understood. To add to that, sometimes as the top management's vision of quality sieves downwards through the lower management levels, the vision or the plan can lose both clarity and momentum. Thus, managers at all levels need to develop the ability to communicate effectively as well as have the willingness to listen and learn from colleagues (Patro, 2013, p.2691). Also, a good communication and feedback system are very important in conveying ideas to the management and to incorporate the necessary change required. Gherbal, et. al 2012, p.81), indicated that communication is a part of the cement that holds together the bricks of the total quality process. Effective communication will reduce fear in the organisation enabling the implementation of QM (Deming, 1986, p.10).

2.8.6 **Process Management**- Process may be defined as a set of interrelated or interacting activities which transforms inputs into outputs. A strong reference to processes primarily means that the attention has significantly shifted from final results (products and services) to the activity chain shaping these products (Luburić, 2015, p.109). There should be strong emphasis on processes that impact on quality of goods and services. Thus, to achieve better quality of products and processes, the key processes must be identified and improved continuously (Jamali, et.al, 2010, p.113). According to the international standard ISO (ISO, 2015, p. 2), '*the organisation shall establish, implement, maintain and continually improve a quality management system, including*

the processes needed and their interactions'. The organisation has to establish processes necessary for quality management system and to apply them in the whole organisation. It has to determine required inputs and expected outputs from these processes, their order and mutual interactions, as well as criteria, methods, including the measurements and related performance indicators necessary to ensure that the performance of these processes and their management are efficient. The organisation has to allocate required resources and ensure their availability, to determine responsibilities and authorities in these processes, to determine risks and possibilities in line with the quality management system requirements and to plan and pursue appropriate measures for their resolving.

2.8.7 **Continuous Improvement**- Continuous improvement can be found in the origins of QM with the onset of quality circles. The culture of continuous improvement implies better quality and lesser variation which results from process management practices that bring about incremental improvements in products, services and processes (Zairi, 2002, p.1170). Continual improvement of the organisation's overall performance should be a permanent objective of the organisation

2.8.8 **Teamwork**- The purpose of teamwork is to have everyone in an organisation working together to achieve a common goal. Teamwork can unite all employees of an organisation in the success of quality improvement. This factor is important to the QM implementation process as it improves communication within the organisation, builds self-confidence of staff and breaks the bond of dependency on the organisation (Oakland, 1995). Teamwork is essential for change management, implementation of strategic plans, building a sense of involvement among employees and solving problems.

2.8.9 **Organisational culture**- this refers to the core beliefs, values, norms and social customs that direct the way individuals act and behave in an organisation (Kundu & Manohar, 2012 p.306). These values and expectations that direct behaviour are learned, in view of what has worked for and against its welfare previously (Lapiņa, Kairiša & Aramina, 2015, p.772). The implementation of QM initiatives in organisations sometimes require very essential reforms in areas such as culture within the organisation. Many organisations show some resistance to trying out basic reforms (Roldan, Leal-Rodríguez & Leal 2012, p.185). This resistance to change may be due to fear of the unknown, of doing things differently, of trusting others, and of making mistakes. Deming (1982, p.101) argues that it is essential when undertaking the quality

revolution to 'drive out fear', and it is imperative to take this message seriously when building a quality institution.

According to Cameron and Quinn, (2011, p.8), a typical error in organisations desiring to improve is that they do not outline a typical perspective with respect to where organisation is starting from and how that contrasts from a future state. These types of organisations frequently dispatch a change activity without thinking about the need to build up a consensual perspective on the present culture; to arrive at agreement on what change means and does not mean; the particular changes that will be started, halted, and upgraded; the measurements and achievements required for accountability; the communication system required; and the on-going leadership demands faced by organisations amidst culture change. However, to survive the ever changing global environment, culture has to be reviewed and re-adjustments to be in tune with the prevailing economic, political, social and technological realities so as to improve on efficiency in the organisation (Sebastianelli & Tamimi, 2003, p.2692).

Mission and Vision statements have been identified as strategic tools which can be used in the formulation of an organisation's culture (Bajaj, Garg, Sethi (2018). According to Orhan, Erdogan and Dormaz (2014, p.252) *"A vision statement describes what the organisation wants to be in the future while a mission statement describes the purpose of an organisation or why it exists"*. The mission statement has been described as an "implementing arm" of the vision (Sheaffer, Landau & Drori 2008, p. 50) and also as a vehicle through which employees can shape an enthusiastic bond with the organisation and its objectives (Campbell & Yeung, 1991). The mission statement envelops an organisation's way of thinking, identity, and qualities giving meaning to its objectives, norms, choices, activities, and regular conduct (Hirota, Kubo, Miyajima, Hong & Park, 2010, p.1136; Khalifa, 2011, p.30). Therefore, the mission and vision statements can be utilized as communication apparatuses via which management beliefs, perspectives, and approaches are passed to employees and other stakeholders (Hirota et al., 2010).

2.8.10 **Performance measurement-** Studies show that organisations wishing to implement QM should imbibe performance measurement which will measure, monitor and reward the performances of the organisation. Proper performance information should be collected and also communicated across the organisation. Having a two way communication in organisations is important for an effective performance measurement system and benefits the organisation motivating employees, promoting employee empowerment and encouraging teamwork (Cheng, 2006, p.765). An effective

performance measurement system provides timely and accurate feedback on the efficiency and effectiveness of organisation's processes (Kaplan & Norton, 1993, p.135)

Self-assessment and benchmarking are both QM techniques used by organisations to measure performance of products and processes. Benchmarking usually involves investigation of best practices of leading organisations in an industry. Using the exemplary organisation approach as discussed in section 2.5.5, organisations collect data internally and study it to understand processes and identify areas for improvement. External data is collected either through data bases from other organisations or through visits to other organisations to study their processes. The external data is then compared to internal data to identify areas in the organisation's processes that need improvement and develop plans to carry out these improvements (Voss, Chiesa & Coughlan, 1994, p.84). Benchmarking allows organisations to improve their performance by gaining from external sources. Also, the purpose of the evaluation is to give a starting point to the understanding of quality issues and the identification of areas to improve. In this way, benchmarking can significantly impact the improvement of key processes and hence, improve the quality level. Without benchmarking, organisations would presumably not know their relative performance and would probably neglect to plan their processes more efficiently (Hietschold, Reinhardt & Gurtner, 2014, p.6263).

Self-assessment is defined as the consistent and systematic review of an organisation's actions and results. Self-assessment can be utilized to compare the performance of divisions and units inside an organisation (Cheng, 2006, p.776).

Identifying factors critical to effective implementation of QM initiatives is important, but, implementing QM is not an easy job, particularly in public sector organisations, many barriers or challenges preventing QM implementation in the public sector organisations are stated in literature (Emeje, Ekere, Olayemi, Isimi and Gamaniel, 2019; Maleyeff, 2014; Mosadeghrad, 2014; Suleman & Gul, 2015). In next section of this chapter, these barriers are discussed.

2.9 Barriers of QM implementation

Implementing QM initiatives require some changes to be made in organisations. Organisations go through transformations that usually modifies or restructures parts of its sections (Bounabri, Ahmed, Elmadani, Latifa & Amina, 2013, p.38). Research has shown that implementing QM initiatives can be challenging for both public and private sector organisations due to changes

which have to be made and several barriers have been identified as obstacles to the successful implementation of QM (Sebastianelli & Tamimi, 2003, p.45). Cătălin, Bogdan, & Dimitrie (2014, p.1237) suggests that understanding the barriers that are likely to impede the implementation of the QM allows organisations to develop more effective strategies for improving the chances of successful deployment of QM and thereby achieve the benefits associated with implementation of QM initiatives such as increased customer satisfaction, and increased employee motivation. This section discusses the barriers every type of organisation might face in implementing QM and goes further to discuss those which majorly affect public sector organisations.

A classification of the barriers that prevent the implementation of QM have been classified into five categories (Mosadeghrad, 2013, p.152; Cătălin, et.al, 2014, p.1237). They are; strategic, structural, human resource, contextual and procedural barriers. They have been described as follows;

- **Strategic barriers**- Catalin, et. al (2014, p.1238) describe these as obstacles with the greatest negative impact on the successful implementation of QM. They are mainly related to the management and leadership of the organisation. Examples include; lack of top management support, inadequate planning, lack of long-term vision and a clear direction and lack of government support and political uncertainty.

- **Structural barriers**- these have been described by Catalin, et. al (2014, p.1238) as barriers related to the structure, systems and physical resources necessary to implement QM. Examples of barriers categorized as structural barriers include lack of physical resources, lack of information systems, lack of financial support and inappropriate organisational structure.

- **Human resources barriers**- Catalin, et. al (2014, p.1238) describe human resource barriers as obstacles related to human factors. Examples include; lack of employee engagement, resistance to change, lack of training and education of employees, lack of motivation and satisfaction of employees and lack of recognition and rewarding for success

- **Contextual barriers:** these have been described by Catalin, et. al (2014, p.1238) as obstacles related to organisational culture. Examples include; poor communication, lack of innovation, cultural issues and poor coordination.

- **Procedural barriers**: Catalin, et. al (2014, p.1238) describe procedural barriers as obstacles generated by the complexity of the processes. Examples include; lack of focus

on the customers, lack of partnership with suppliers, lack of a system of evaluation and self-assessment and bureaucracy.

These barriers as categorized by Catalin, et. al (2014, p.1238) can affect any type of organisation either private or public and various studies have identified these barriers present within organisations implementing QM. Khan (2011, p.155) identified lack of planning, lack of efficient human resources practices, inadequate infrastructure for total quality management, lack of support from leadership and lack of customer focus as barriers to implementing TQM in service organisations in Pakistan. Arshida and Agil (2013, p.257) identified lack of top management commitment, government influence and poor vision and plan statements as barriers to the implementation of QM in Libyan iron and steel company. Bounabri,, Oumri, Saad, Zerrouk & Ibnlfassi (2013) identified bureaucracy, poor interdependence between departments in organisations, lack of communication, poor top management commitment and insufficient trainings as significant obstacles to ISO 9001 implementation in Moroccan public sector organisation.

Barriers that prevent organisations from effective QM implementation exist internally as well as externally. Internal barriers are related to the internal environment of organisations and are mainly associated with the management and leadership of the organisation and human factors (Mosadeghrad, 2014, p.330). External barriers are related to the external environment of these organisations such as government policies and regulations (Antony, Rodgers & Cudney, 2017, p.1408). Although these barriers affect both public and private organisations, there are some barriers which are unique to public sector organisations due to their context. Public sector organisations are easily affected by the political and financial situation of the government (Radnor, 2010, p.51) and are also easily influenced by government regulations and public bureaucracy (Radnor, Wally, Stephens & Bucci, 2006, p.102). For instance, political influence from political holders has been identified (Shebbs, 2015, p.6) to interfere with employment and promotion in government-owned organisations. This factor will have a great influence on the availability of financial resources because, as discussed by Okeke, Onuorah, & Okonkwo, (2016, p.47), some government-owned organisations end up employing more staff than they need causing financial resources allocated for quality improvement projects to be diverted to paying staff. Also, recognition and promotion of employees can also be influenced by politics where recognition of employees is not through merit based on staff contributions to QM implementation, but rather based on affiliation with certain political figures (Shebbs, 2015, p.6).

Government regulations and policies also act as factors which interfere with QM implementation in PSOs. For instance, government policies can constrain the senior management of PSOs from acting on their full commitment to successful QM in the organisation for instance when the management of a PSO cannot provide a conducive operational environment nor provide the necessary resources required for employee training and empowerment because of government policies and regulation, in such a situation, employees might perceive that the management is not fully committed to QM implementation. (Idam, 2014, p.28).

It is important when studying the barriers to QM implementation, to research not just those which are internal to the organisation and can be eliminated but also those external factors which are unique to the public sector and which can have a great impact on the QM implementation. It is important ensure that managers of PSOs are aware of these barriers and the influence they have on the implementation process so that they can make informed decisions as to how to eliminate internal barriers and reduce the effect of external barriers on QM implementation. It is also important to inform policy makers of those external barriers which are due to government regulations and policies so that they can, where possible, make policies which will not hinder QM implementation in PSOs but rather will facilitate the QM implementation process.

Therefore, the emphasis in this research was to identify and categorise the barriers perceived to be operational in the Nigerian Space industry and to understand the perceived levels of their impact on QM implementation within this context. This analysis of these barriers is further discussed in chapter 3, section 3.2.7.4

Bearing in mind the unique situation of public organisation, a review of fifteen studies on barrier/challenges to QM implementation in the public sector was done to explore the common barriers to QM implementation (see Appendix 4). The criteria for literature review are outlined in Table 2.4 below.

Table 2.4 Criteria for identifying barriers to QM implementation (Source: The Author)

Search Area	Area of focus
Search themes	Quality Management; including TQM, Quality Control/Quality Assurance, Lean Six Sigma, Lean, ISO 9001 and Continuous Improvement
	Barriers/Challenges/Obstacles of Quality management implementation in Public sector organisations
Study methodology	Case study, Survey, Literature review
	Interviews, Questionnaires and Discussions
Type of Articles	Journal and Conference papers
Search field	Paper topic, Abstract, Keywords
Databases	Emerald, Academia, EBSCOhost, Researchgate, SAGE, Wiley, Science Direct, Springer, Scopus, ProQuest, Taylor& Francis
	* Search excluded sources inaccessible by the University of Portsmouth
Review Time frame	2009-2018

Twenty common barriers were identified from the review and are presented in the Table 2.5 below.

Table 2.5 Barriers to QM implementation in PSOs (Source: The Author)

Barriers	
Lack of top management commitment	Weak employee commitment and involvement
Insufficient resources/facilities	Inappropriate/lack of organisational culture change
Inappropriate reward system	Poor recognition programme
Bureaucracy	Weak quality improvement structure
Ineffective use/ lack of quality measurement	Lack of customer focus
Poor planning	Inadequate use of and teamwork and coordination
Lack of training	Lack of communication
Resistance of change by the workforce	Lack of appropriate information systems
Poor infrastructure	Political interference
Competing management priorities.	Management instability

Bearing in mind the major influence the external environment can have on public organisations, the barriers to QM implementation for this study has been classified into two broad categories; Internal and External barriers, where the internal barriers are those barriers which are within the control of the organisation and external barriers are barriers which cannot be controlled by the organisation. Table 2.6 below illustrates the two categories and examples of the barriers that fall under each category. These barriers are drawn from those gotten from Table 2.5 above.

Table 2.6. Internal and External Barriers to QM implementation in the public sector (Source: The Author)

Categories	Examples of Barriers
External Barriers	Political interference
	Bureaucracy
	Lack of appropriate information system
	Competing management priorities
	Poor planning
	Management instability
	Insufficient facilities
	Poor infrastructure
Internal Barriers	Lack of top management commitment
	Lack of customer focus
	Lack of training and education of employees
	Resistance to change
	Lack of quality measurement
	Weak employee commitment and involvement
	Weak quality improvement structure
	Inappropriate/lack of organisational culture change
	Inadequate use of and teamwork and coordination
	Lack of recognition system
	Lack of a reward system
	Lack of organisation communication

Based on the review to identify the common barriers to QM implementation in PSOs, the barriers are briefly described below as external barriers and internal barriers.

2.9.1 Internal Barriers to QM implementation in public sector organisation

- Lack of top management commitment - Many authors have identified lack of top management commitment as the number one barrier of QM implementation (Al-Khalifa & Aspinwall, 2000, p.202, Rokke & Yadav, 2012, p.660, Al-Zamany, Hoddell & Savage, 2002, p.244, Sebastianelli & Tamimi, 2003, p.45). The success of QM implementation depends largely on management's ability to lead the organization's quality transformation. Absence of management commitment to quality is recognised in their inability to give the

vision and course to the whole organisation to get focused on quality. It could likewise be recognised in their inability to communicate the vision, not enabling others to follow up on the vision, not planning for transient successes and not consolidating improvements and delivering more.

- Employee's resistance to change- Human workforce is the most important and valuable asset in any organisation consequently employee's resistance to change can serve as a great barrier to QM implementation as identified by Talib & Rahman, (2015, p.608). Employee may resist implementation of QM initiatives due to many reasons such as a misunderstanding of the benefits of change, fear due to lack of competence or of assuming new responsibilities. Kosgei, (2014, p.13) affirms that many of the barriers to QM involve an element of fear and uncertainty. Changing the culture of an organisation could be fundamentally the most challenging aspect of the QM implementation process because resistance to change is human nature. Reger, Gustafson, Demarie, and Mullane (1994, p.579) provides a method to effectively implement QM using mid-range changes whereby the magnitude of change introduced is at an intermediate level which is perceived to be sufficiently large enough to overcome cognitive inertia, but it is not so great that it overwhelms the organisation.

- Lack of training- training is recommended as an essential element of human resource inclusion and while most organisations train employees in functional and managerial skills, training efforts should focus on quality. In the view of Rokke & Yadav (2012, p.661) lack of training leads to poor competence in fulfilling tasks related to the quality issues. Effectively training employees in quality issues provides a multiplier effect in improving the quality of an organisation's products, services and processes (Khan, 2011, p.159)

- Lack of customer focus- There are also a number of challenges with the customer focus as noted by some authors (Sebastianelli and Tamimi, 2003, p.243; Rokke & Yadav, 2012, 662). PSOs rarely involve their customers during the QM implementation process (Mosa deghrad, 2014, p.328). Customers need to be involved in the process of implementing QM because their requirements are what should be taken into consideration to improve the products and services rendered by PSOs. If their needs are not known, then organisations will not know what areas of improvement to work on.

- Lack of recognition and reward system- lack of incentives for employees in the form of reward or recognition badly affects QM implementation process. Incentives are important for employees to feel that their hard work and useful ideas are valued by the organisations.

To reflect this, employees who have outstanding performance should be recognised and rewarded financially or with other tangible rewards such as shopping vouchers, trainings or a holiday (Nasir, 2015, p.7).

- Lack of quality measurement- studies identified that many organisations find it difficult to measure results of quality implementation (Hassan & Fan, 2016, p.2; Mosadeghrad, 2014, p.330). Lack of meaningful measurement can be a strong barrier to QM as it is a critical feature of QM. Without proper measurements, organisations can not recognise and reward performance of outstanding employees. Organisations which do not carry out self-assessment will not know what processes, products or service have improved or needs improvement in the organisation (Mosadeghrad, 2014, p.330).

- Lack of organisation communication-poor organisational communication can cause employees to feel ignored and become dissatisfied with quality related issues in the organisation. Employees might feel that the senior management wants to take credit for all the improvements achieved in the organisation. This can be eradicated by having a two-way communication in the organisation which will facilitate employee involvement and participation (Lasrado, Arif, Rizvi & Urdzik, 2016, p.7).

- Weak or lack of employee commitment and involvement- employees need to be motivated and encouraged for their involvement; such involvement can be increased if employees develop a sense of belonging to the organisation (Lasrado et.al, 2016, p.7). Employees' confidence in the senior management plays a key role in the success of the success of QM implementation (Islam, 2007, p.4; Janassen, 2004, p.210). When employees see that their suggestions are not considered and applied in the organisation, they may begin to feel that they are not valuable assets for the organisation and likely show less commitment to implementing quality improvement initiatives in the organisation. Every employee should be encouraged to participate in the implementation process of QM (Lasrado et.al, 2016, p.7).

- Weak quality improvement structure- QM requires a suitable quality structure to be implemented successfully. However, some PSOs do not have QM structures and systems established in their organisation to support QM implementation (Mosadeghrad, 2014, p.330).

- Inappropriate/lack of organisational culture change- factors such as a bureaucratic management style can impede QM implementation. Management should compare the working culture necessary for successful implementation of QM and change the

organisation's culture where necessary to facilitate QM implementation. This can be achieved by collecting data concerning the present management style and the disadvantages it has, this will help the managers focus on what specifically needs to change (Shibani et.al, 2010, p.307).

- Inadequate use of and teamwork and coordination- lack of teamwork and coordination can sabotage the process of QM implementation.

2.9.2 External barriers to QM implementation in public sector organisations

- Lack of resources- studies indicate that having adequate resources play an important role in implementation of QM initiatives and so having insufficient funding is a major barrier in the way of effective implementation of QM (Sajjad & Syed, 2017, p.5; Catalin, et. al, 2014, p.1238). Public sector organisations do not have direct financial control and are required to spend funds allocated to them from the government through the heads for which the funds were released (Sajjad & Syed; 2017). Sometimes these resources are inadequate, making it difficult for organisations to allocate substantial amounts of funds for quality initiatives. Having inadequate funds leads to slow progress and dissatisfaction when the expected outcomes are not accomplished on time. It is common to therefore, see public organisations who are impatient to see the outcomes of QM implementation get disillusioned and abandon it.

- Bureaucracy deep-rooted in the government system can act as a major barrier to QM implementation. The structural frameworks of PSOs are usually provided by the government of the country which is usually bureaucratic (Kozhevina, 2015, p.4). Excess layers of management quite often lead to replication of duties and responsibilities and slows down decision making. Excess time could be spent in trying to obtain or pass across a piece of information causing delay in getting things done in the organisation (Shebbs, 2015, p.50). This could become tedious for employees causing them to leave the quality implementation in the organisation to be a management's job (Patro, 2013, p.2691). It is contended that bureaucratic structural framework in the government system can inhibit creativity and innovation of the public sector due to extended periods of working in isolation. Creative ideas are more often the product of interaction and influence, rather than remote working (Lasrado et.al, 2016, p.7).

- Management instability and competing management priorities - when QM is not treated as a key strategic issue on the top management's agenda in PSOs, organisational goals and priorities change with every new top management team. When the government appoints a

Minister overlooking the affairs of an organisation or changes the Director in the organisation, plans and priorities usually change as well. This instability in management can affect QM implementation as the new management might implement some changes which will affect the QM implementation process or even stop the process of implementation (Samarasinghe, 2009, p.141).

- Poor planning such as the late passing of a country's budget can affect QM implementation in PSOs which depend on the funds from government to carry out projects and programmes. Lack of resources is also a result of poor planning. Strategic planning by the government ensures that resources are available for PSOs to carry out projects and improve the quality of their processes, products and services (Mosadeghrad, 2014, p.330).

- Not having an efficient information system which allows free information flow can affect decision making by policy makers. When policy makers do not have enough information concerning the activities of an organisation, they can make decisions that are detrimental to the implementation of quality management initiatives such as cutting budgetary allocations to the organisation or implementing administrative policies which will affect the operations of organisations within a sector (Shebbs, 2015, p.50; Scorsone, 2008, p.63). Information sharing in the form of periodic reports on the performance of PSOs are considered to be vital for the successful implementation of QM, therefore, an effective information system should be in place to enable policy makers obtain the necessary information which will enable them make decisions that will be of benefit to the QM implementation process in PSOs.

  Information sharing between PSOs, can also stimulate creativity and cause these organisations to innovate ways to facilitate QM implementation in their various organisations.

- Inadequate infrastructure- failure to provide adequate infrastructure to support quality improvement programmes is another major barrier to QM implementation (Mosadegrad 2013, p.150). Core infrastructure such as electricity and telecommunications facilitate the implementation of QM for the production of quality products and services (Obokoh & Goldman, 2016, p.5; Oyedele 2012, p.1). Inadequate infrastructure creates a poor work environment for employees in PSOs (Catalin, et. al (2014, p.1238). It is important for the government to pay attention to the state of existing infrastructure available to PSOs as this has been seen to be crucial to the implementation of QM (Isa & Yusoff, 2015, p.2).

- Political interference badly infects the outcomes of an organisation. There is the need to minimise the interference of politicians to ensure effective implementation of QM and merit policy. Studies revealed that due to pressure from politicians, PSOs are prone to employ more employees than they need (Orumwense, 2014, p.3). This can have an effect on the resources provided to run the affairs of such organisations. Funds meant to carry out quality improvement projects can be diverted to paying staff salaries instead. Political interference can also be in the form of governmental regulations which can have a detrimental effect on QM implementation in PSOs (Anthony et.al 2017, p.1404; Suleman & Gul, p.131).

Studies show that it is important for organisations within the public sector who are in the process of implementing QM initiatives to be aware of the barriers which they will encounter in their journey. Identifying barriers to QM implementation and ranking them from major barrier to least barrier is important for top management of public organisations and policy makers to easily identify the top most critical barriers and the least critical barriers and understand areas to commit public resources to in order to support public sector organisations in their quality improvements efforts (Jacobson, 2008, p.8)

Summary of chapter

QM is a philosophy regarding constant development. Every organisation plots its own customised route to success making use of QM principles, tools and techniques along the way. In implementing QM, public organisations must take account of a number of distinctive features because public organisations have a unique mission and have to address different requirements from a wide range of customers.

This chapter has discussed the definitions and historical development of quality management, the benefits of quality management, various approaches to QM implementation, its application in the public sector, factors which are critical for successful implementation of QM and challenges which act as barriers to the successful implementation of QM in public sector organisations.

The literature however shows that most of the studies on QM in Nigeria are focused on the application of quality in manufacturing and services, mostly in the private sector. Although there are some studies of QM implementation in the public healthcare and education sectors, a study of the employee perceptions of factors for successful implementation of QM in a government agency or was not found. This study attempts to examine how employees perceive

the factors impacting on QM in different organisations of the Nigerian public Sector. In the next chapter, the research methodology and instruments utilised for data collection to achieve the research objectives are discussed.

CHAPTER 3
METHODOLOGY

3.1 Introduction

This chapter discusses the research philosophy, approaches and methods of data collection and data analysis. This chapter additionally discusses how the researcher embraced an appropriate research design to achieve the research aims and objectives and presents rationales for the research design and method adopted for this study. This research is both descriptive and exploratory in nature allowing the researcher to explore a phenomenon, which is how quality management implementation occurs in two Nigerian public sector organisations.

3.2 Research Design

The research design can be depicted as the plan via which the aims and objectives of the study are acheived. It features how the data will be collected, analysed, interpreted and reported. According to Creswell, (2014, p.20), presenting these approaches forthright helps as useful direction during the research and ultimately, how elucidations will be created from the research. Setting out the research design involves the selection of the research philosophy, approaches, data collection methods, strategies, and data analysis techniques, which all affect how the research aim and objectives are realized.

As a guide "The Research Onion" model, created by Saunders, Lewis & Thornhill (2016, p.124), is used to describe how this research has been planned to achieve the research objectives beginning with the research philosophy discussed in the next section. Note that the highlighted words in figure 3.1 represent the choices used by the researcher in this research.
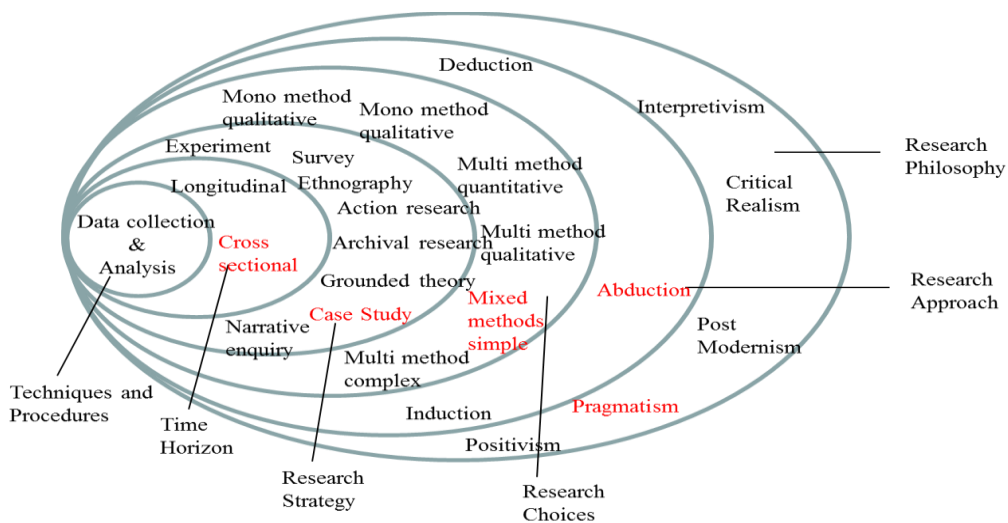
Figure 3.1. The Research Onion adopted from Saunders et al. (2016, p.124).

3.2.1 Research Philosophy

This refers to a system of beliefs and assumptions about the development and nature of knowledge (Saunders et al, 2016, p. 124). In other words, the belief in the ways data about a phenomenon should be collected, analysed and used. Determination of a suitable research philosophy advises the researcher's choice with respect to the research approaches and methods. To ascertain the research philosophical position, it is critical to initially comprehend three key perspectives which reflect on the research philosophy. They are; Ontology, Epistemology and Methodology (Guba & Lincoln, 1998, p. 109)

3.2.1.1 Ontology relates to the nature of reality, to the study and nature of being and to our ways of being in the world. (Zikmund, 2015, p. 57). For Guba and Lincoln (1998, p. 109) the ontological question to answer is; "*What is the nature of reality, and what is there to be known about it?*". Two ontological positions are available to researchers; Objectivism and Subjectivism. Objectivism implies that social phenomena confront us as external facts beyond our reach or influence (Bryman & Bell, 2015, p. 32). Objectivism incorporates the assumptions of the natural sciences. Ontologically, objectivists consider social beings to be like physical objects of the natural world and epistemologically, objectivist look to find certainties about the social world through the mechanism of observable quantifiable facts from which law-like speculations can be drawn about the all-inclusive social reality (Saunders et.al 2016, p. 128). Although this is an ontological position common with the natural sciences some researchers in the social sciences still use the objectivist ontological position (Matthews & Ross, 2010, p. 26). Alternatively, Subjectivism affirms that social truth is produced using the observations and coming about activities of social entertainers (Saunders et.al 2016, p.130). A subjectivist researcher thinks about himself/herself as a major aspect of the social world and brings his/her own undertones and understandings to his/her investigation (Matthews & Ross, 2010, p. 26).

3.2.1.2 Epistemology the other key assumption is the theory of knowledge and how we know things (Matthew & Ross, 2010, p. 18). According to Guba and Lincoln (1998, p. 109) the epistemological question to answer when determining the research philosophy is; "*What is the nature of knowledge and the relationship between the researcher and the participants?*"

3.2.1.3 Methodology is described by Schwandt (2007, p. 190) as, "*the process of how we seek out new knowledge, the principles of our inquiry, and how the inquiry should proceed*". While Krauss (2005, p.759) states that "*the methodology identifies the particular practices used to reach knowledge*". According to Guba and Lincoln (1998, p. 109) the methodological question

to answer when determining the research philosophy is *"How can the researcher go about obtaining the desired knowledge and understanding?"*

Having an awareness of ontology, epistemology and methodology enables a researcher to adopt an appropriate philosophical position among the four philosophical positions which are; positivism, critical realism, interpretivism, postmodernism and pragmatism (Saunders et al., 2016, p. 136).

3.2.1.4 Positivism- this philosophical stance is adopted by most natural researchers. It narrates the procedure of observing social reality to produce a law-like overview similar to the outcome of natural research (Saunders et al., 2016, p. 151). A positivist way to deal with social research normally implies: quantitative information is gathered; parts of the social world or social phenomena are estimated and causal connections between various parts of the social world are looked for. Huge data sets and statistical analysis are frequently utilized (Matthews & Ross, 2010, p. 27).

3.2.1.5 Interpretivism is considered to be contrary to positivism in the sense that it depends on the view that a strategy is vital that regards the contrasts among individuals and objects of the natural sciences and along these lines requires the social researcher to get a grasp on the significance of social activity (Bryman & Bell, 2015, p. 29). An interpretivist approach normally has the accompanying highlights: Knowledge assembled incorporates individuals' translations and understandings. The principle focus is around how individuals decipher the social world and social phenomena, empowering alternate points of view to be investigated. The researcher is interpreting other people's understanding in terms of the theories and concepts of the social researcher's discipline – studying the social phenomenon as if through the eyes of the people being researched. The researcher works with the information accumulated to generate theory (Matthews & Ross, 2010, p. 29).

3.2.1.6 Critical realism is a philosophical stance which accepts the autonomy of reality from the mind and context (Bryman & Bell, 2015). A critical realist's way to deal with social research normally implies: uncovering concealed structures and systems; revealing power relations and predominant belief systems; inquire about that prompts activity; gathering qualitative and/or quantitative data (Matthews & Ross, 2010, p. 30).

3.2.1.7 Postmodernism underlines the job of language and of power relations, trying to address acknowledged perspectives and offer voice to alternative marginalised opinions (Saunders et.al 2016, p. 141). A postmodernist researcher would normally concentrate on the continuous

procedures of sorting out, overseeing and requesting that establishes substances. They would challenge organisational concepts and theories and try to show what viewpoints and realities they avoid and leave quiet and whose interest they oblige. A postmodernist is open to the deconstruction of any types of data and embraces in-depth inquiries of phenomena (Saunders et.al 2016, p. 142)

3.2.1.8 Pragmatism depicts research as a process where ideas and theory are speculations of our past activities and encounters, and of interactions we have had with the environment (Sekaran & Bougie, 2013, p. 30). Pragmatism is a middle-way philosophical stance (Saunders et.al 2016, p. 143). This philosophical stance allows the researcher to pick numerous or mixed methods that are believed to be reasonable to answer the questions, which may incorporate distinctive philosophical positions (Holden & Lynch, 2004, p. 406). A pragmatist acknowledges that there are a wide range of methods for translating the world and undertaking research (Saunders et.al 2016, p. 144). This philosophical position has been adopted for this research.

3.2.1.9 Rationale for choice of Research Philosophy

Holden and Lynch (2004, p.405) have argued that there is no correct or incorrect research philosophy. Others agree that what is important is using the most suitable methods to answer the research questions (Connell & Nord, 1996, p.410; Hughes & Sharrock, 2016, p.16). Denscombe (2014, p.4) also suggests that researchers recognize the distinctive research alternatives that are accessible and settle on a justifiable decision as a major aspect of the research design process. Therefore, the rationale upon which the decision of using a pragmatic philosophical stance has been provided.

In this study, the pragmatic philosophical stance assumed for this research was based on the nature of the research objectives studied. The study made use of multiple methods and included some research characteristics of the positivist and interpretivist philosophical stances. The research used a positivist stance by employing a survey to determine the QM factors and perceived level of implementation of the identified factors. A positivist approach was suitable as it is inclined to the use of questionnaires for data collection and numerical analysis for precise hypothesis testing. The positivist stance focuses on discovering statistically measurable and reliable facts leading to the production of trustworthy and meaningful data. Furthermore, positivist research makes use of a structured methodology to enable replicability (Saunders et.al, 2016, p.138). An interpretivist stance was also adopted for this study making use of

interviews which focused on understanding employees' perception of the implementation of QM factors within their organisations. This choice is based on the possibility that there is more than one reality out there and it is expected that the researcher's thinking is shaped to some extent by their own experience as a member of the social context within which the research is taking place (Denscombe, 2014, p.2). The perceptions of QM implementation are not formed and set by just social interaction, but rather they change continuously. A pragmatic stance was therefore adopted for this study as it allowed the researcher to be flexible to adopt the most practicable approach to address the research questions.

3.2.2 Research Approach

This refers to the strategies and procedures utilised by the researcher to carry out the research. There exist three approaches: inductive, deductive and abductive. Trochim, Donnelly, and Arora (2015, p.25) portray the inductive and deductive research approaches as the "*top-down approach and bottom-up approach*", respectively. These approaches recommend the framework by which the research is being approached; either by testing existing theories or building new theories from observations. In general, the inductive approach is a "theory building process", whereas the deductive approach is a "theory testing process" (Hyde, 2000, p. 83). In the case of the inductive approach, the researcher begins the research by gathering data to investigate a phenomenon and afterwards analyses it to develop a theory (Saunders et al., 2016, p. 145). With the deductive approach the researcher begins with theory developed from literature and then creates a research strategy to test the theory. (Saunders et al, 2016, p. 144). According to Trochim, Donnelly & Arora (2015, p.23), when using a deductive approach, the researcher implements suitable methodologies to accept or reject the hypothesis; the deductive research approach begins from theory and ends in confirmation.

Then there is the abductive approach, where the researcher gathers data to investigate a phenomenon, identifies themes and describes patterns to produce a new or modify an existing theory which is afterward tested via additional data gathering (Saunders et al, 2016, p. 145). This is the approach the researcher has adopted for this research.

3.2.2.1 Rationale for choice of Research Approach

Due to the nature of this research, the abductive research approach was adopted to achieve the research objectives. Following the deductive research approach by moving from theory to data, the researcher examined the literature to determine the QM factors which were used to design a questionnaire for data collection. The questionnaire produced numerical data which has to be

statistically analysed. Then again, an inductive approach was trailed by conducting face-to-face semi-structured interviews. The data collected through the interviews was analysed to categorise emergent themes which were used to form new theories based on the employees' understanding of QM implementation. This approach is projected as a way of overcoming the limitations linked with inductive and deductive positions (Bryman & Bell. 2015, p. 27) and is often advantageous, although one approach or another is often the dominant approach (Saunders et al, 2016, p. 149).

3.2.3 Research Choice

This refers to the choice a researcher makes as to whether to select a qualitative, quantitative or combined quantitative and qualitative data collection strategies and processes (Saunders, et al., 2016, p.164). Various authors have provided definitions to distinguish these research choices, Bryman & Bell, (2015, p.37-38) define qualitative research as a research strategy that typically highlights words as opposed to measurement. Qualitative research is not interested with numerical illustration, but with the in-depth understanding of a given issue. It is interested about parts of reality that cannot be evaluated, concentrating on the comprehension and clarification of the elements of social relations. Queirós, Faria & Almeida, (2017, p. 370) posit that the goal of qualitative methodology is to deliver in-depth and illustrative information in so as to comprehend the different elements of the issue under analysis. Qualitative research makes use of research strategies such as focus groups, case studies, interviews (structured, unstructured and semi-structured), observation, ethnography and field research. The essential quality of the qualitative approach is the capacity to test for basic values, convictions, and presumptions (Yauch & Steudel, 2003, p. 472). This approach delivers the detailed depiction of participants' feelings, conclusions, and encounters; and translates the implications of their actions (Rahman, 2017, p. 104). Maxwell, (2012) also sees the qualitative research approach as a research design that has an adaptable structure and can be built and remade to a more prominent degree. On the other hand, there are weaknesses with the qualitative research approach, first of all, the procedure is considered time-consuming, Secondly, an important problem could go overlooked or be ignored as Silverman (2013, p.9) argues, qualitative research approaches sometimes forget about logical sensitivities and concentrate more on implications and encounters. Thirdly, Sallee and Flood (2012, p.139) found that policymakers give low validity to results from qualitative approaches and often prefer the use of quantitative research when research is required. Fourthly, the sample size in qualitative research is usually small, and raises the issue of generalizability to the entire populace of the research (Thomson,

2011, p.79). Lastly, interpretation and analysis of qualitative data are considered to be more difficult and take a considerable amount of time (Berg & Lune, 2012, p. 4; Flick, 2011, p.103)

By contrast, Bryman & Bell, (2015, p.37-38) define quantitative research as a research strategy that emphasises quantification in the collection of data. Quantitative research methods are portrayed by the gathering of data which can be analysed numerically, the results of which are commonly presented utilizing measurements, tables and charts. According to Rahman, (2017, p. 105), this research method endeavours to investigate the responses to the inquiries beginning with what number of, the amount, to what degree. In other words, the method lays emphasis on estimating variables that exist in the social world. Quantitative research methods make use of research strategies such as field experiments, simulations, surveys, correlational studies and multivariate analysis.

The advantages of quantitative research, as described by Rahman, (2017, p, 106) are that it can be conducted and assessed quickly, quantitative findings can probably be generalised to a whole population or a sub-population as it involves a larger sample which is randomly chosen and data analysis is less tedious as it utilizes statistical software. However, the weakness associated with quantitative research is that it neglects to ascertain in-depth, fundamental meanings and clarifications. It cannot represent how the social reality is formed and maintained, or how people translate their activities and others (Blaikie, 2010, p.200). A further weakness of the quantitative research approach is, it has tendencies of taking a snapshot of a phenomenon: It measures variables at a specific moment in time, and disregards whether the photograph happened to catch one looking one's best or looking unusually disarranged (Schofield, 2007 cited by Rahman, 2017, p, 106). Quantitative research usually overlooks the respondents' experiences and perspectives in highly controlled settings (Ary, Jacobs, Sorensen, & Walker, 2013, p.25) due to a lack of direct connection between researchers and the participants when collecting data. Also, effective quantitative research usually requires a large sample size sometimes several thousand. However, a lack of resources sometimes makes large-scale research of this kind impossible (Choy, 2014, p. 102)

Saunders et al. (2016, p.165) however see the distinction of qualitative and quantitative research as both complicated and confining because in reality many business and management research designs combine qualitative and quantitative components. They give two examples to further stress the point, the first is of a research design making use of a questionnaire but including open questions so that respondents can provide answers in their own words instead

of ticking the suitable box similar to the case in this research. Furthermore, some qualitative data can be analysed quantitatively or can be used to design an ensuing questionnaire.

Some researchers like to be known as qualitative researchers; others like to be known as quantitative researchers. However, there is no best approach between both research methodologies due to the existing strengths and weaknesses among both types of research methodologies (Rahman, 2017, p.102; Queirós et. al, 2017, p. 370). A research design can make use of only one data collection technique and a commensurate analytical procedure, or alternatively, can use more than one, also known as multiple methods, to address the research question. A research design can also be a mixed method research which is a part of multiple methods research that combines the utilization of quantitative and qualitative data collection techniques and analytical methodologies (Saunders et.al 2016, p. 169).

Creswell (2014, p. 62) warns that combining methods is challenging and should only be undertaken when there is a specific reason to do so. Greene, Caracelli, and Graham, 1989 cited by Creswell (2014, p. 62) give a list of five broad reasons for mixing methods as; triangulation, complementarity, development, initiation, and expansion. Bryman (2006) has also provided a detailed list of 16 reasons based on researchers' practices. They include; triangulation or greater validity, offset, completeness, process, different research questions, explanation, unexpected results, instrument development, sampling, credibility, context, illustration, utility or improving the usefulness of findings, confirm and discover, diversity of views, and enhancement or building upon quantitative and qualitative finding.

Researchers have to decide where and how to mix the quantitative and qualitative research approaches. A researcher can decide to mix at the level of design, mix during data collection, mix during data analysis or mix during interpretation (Creswell, 2014, p. 66). Six major mixed methods designs have been recommended by Creswell, (2014, p. 66). These designs provide a useful framework for researchers working to design their own studies. The six basic mixed methods designs are the convergent parallel design, the explanatory sequential design, the exploratory sequential design, the embedded design, the transformative design and the multiphase design (Creswell, 2014, p. 66).

For this research, the researcher chose to utilize the convergent parallel mixed method design. The rationale for this research choice is discussed in section 3.2.4.1 below. By using this design, the researcher implemented both qualitative and quantitative data collection approaches concurrently during the same phase of the research process, making use of questionnaires

(quantitative) and semi-structured interviews (qualitative). The researcher also analysed the questionnaire data quantitatively and the semi-structured interviews qualitatively before merging the two sets of results. Figure 3.2 below shows the convergent parallel mixed method design adopted for this study.

3.2.3.1 Rationale for using Mixed -method Research Choice

The quantitative and qualitative research methods were combined to get a deeper understanding of how the researched organisations are implementing quality improvement factors, and how the employees perceive the implementation of the QM factors. Factor analysis and template analysis were first carried out to identify the QM factors present in both organisations and the barriers obstructing the implementation of these QM factors. The statistical analysis of the questionnaires served as the quantitative aspect of this research, that is the numerical identification of how the organisations are implementing QM. This analysis was additional tested statistically to show if there are any critical contrasts between the organisations. However, it was important as well to understand the employees' perceptions of the implementation of the identified QM factors and through verbal self-reporting, their attitudes toward the QM implementation was prompted. It is acknowledged that the organisations are trying to implement the QM factors, but how are the employees reacting to the process? It was important to include verbal-reporting in the research because the semi-structured interviews gave the researcher the opportunity to understand the meanings that participants of the case organisations, assign to phenomena such as the concept of quality and quality management implementation. The semi-structured interviews, therefore, formed the qualitative aspect of the research.

The use of questionnaires to identify the QM factors and barriers present in both case organisations and semi structured interviews to elicit employees' perceptions about QM implementation propounded the need to use a mixed method research design. Making use of factor analysis, a quantitative research method where frequency and counting are mandatory and semi-structured interviews, a qualitative research position where the researcher corresponds with the participants to understand how they feel about the implementation process.

As two methods were combined together in this study, it was considered vital to establish how they are combined to achieve the aim of the study because according to Creswell (2014, p.66) when combining two methods, researchers should be able to make justifiable conclusions in

working with the two methodologies of research. Access to research participants was considered here as the researcher had limited time in which access was granted to her for data collection. This was considered a limitation for the study. To overcome this limitation, the convergent parallel mixed method design was adopted. Using this method, both quantitative and qualitative data were collected at the same time, the information derived from the separate data collected was later combined in the interpretation of the overall results (Creswell, 2014, p.15). Figure 3.2 below gives an illustration of the convergent mixed method design.
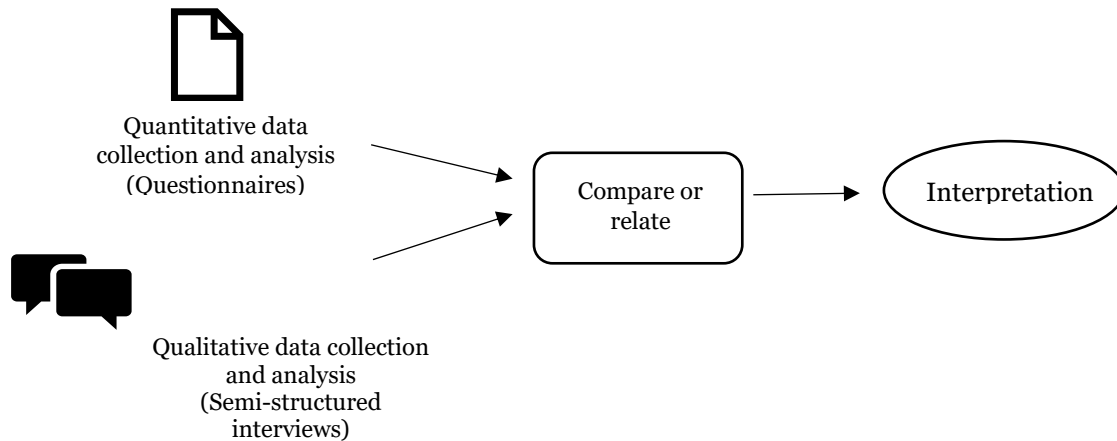
Figure 3.2: The convergent parallel mixed method research design (Source: Creswell (2014, p.69)

3.2.4 Research Strategy

A research strategy can be defined as an arrangement of how a researcher will go about answering his or her research question. There are several research strategies available which are appropriate for precise kinds of study: Survey, Grounded theory, Ethnography, Action research, Case study, Archival, documentary and Experiment research (Saunders et al, 2016, p. 177). Due to the exploratory nature of this research, the Case study has been chosen from the available research strategies because other strategies were neither practically appropriate nor theoretically sensible for the aim of this study.

A survey strategy alone was not favoured for this research on account of the idea of the issue as it requires a more detailed examination than this strategy permits (Saunders et al., 2016, p. 181). Action and experiment strategies were not applicable because they required greater association by the researcher in the procedures of the organisations that were considered (Saunders et al., 2016, p. 178). This was not possible due to time and access limitations.

Grounded theory and ethnography have also not been adopted for this study given that while both theories are for the most part, connected with studies in humanities and sociology (Saunders et al., 2016, p187), they mainly concentrate on delicate issues, such as the social relationships between humans (Suddaby, 2006, p.634) and are less effective in research of this nature as the objective of this research does not only concentrate on delicate issues but on statistical measurable data as well. Finally, the archival strategy was also inappropriate as it is limited to the use of administrative records and documents as source of data (Saunders et al., 2016, p. 183). Administrative records and documents of the researched organisations were inaccessible to the researcher therefore making it impossible to adopt the archival strategy.

3.2.4.1 Rationale for the choice of Research Strategy

Dul & Hak, (2008, p. 4) define a case study as a study in which one case or a small number of cases in their real-life context are selected and data obtained from these cases are analysed in a qualitative manner. The case study research strategy allows for the investigation of a contemporary phenomenon within a real-life context and facilitates the investigation and advancement of a detailed understanding of the subject under examination utilizing, cases as representations also called multiple case studies (Saunders et al., 2016, p. 185).

Yin (2014, p. 16) provides a two-fold definition of case studies. *The first part begins with the scope of a case study;*

(i) *A case study is an empirical inquiry that*
- *investigates a contemporary phenomenon in-depth and within its real-world context, especially when*
- *the boundaries between phenomenon and context may not be clearly evident*

(ii) *A case study enquiry*
- *copes with the technically distinctive situation in which there will be many more variables of interest than data points, and as one result*
- *relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result*
- *benefits from the prior development of theoretical preposition to guide data collection and analysis.*

According to Saunders et. al (2016, p.185), a case study has the capacity to generate insights from intensive and in-depth research into the study of a phenomenon in its real-life context, leading to rich empirical descriptions and the development of theory. To achieve this, case

study research frequently uses a mixed methods approach to fully understand the dynamics of the case.

Regardless of the advantages of case study as research strategy, this strategy has been criticised for its inability to produce generalizable (Tellis, 1997, p.4), reliable and theoretical contributions to knowledge, there is also a concern about its lack of vigour, its potential to take too long and result in massive unreadable documents and its inability to be used for randomized controlled trials (Yin, 2014, p.20; Saunders et. al, 2016, p. 185). However, Yin (2014, p.21) addresses these concerns stating that the goal of case studies is to expand and generalize theories (analytical theories) and not to extrapolate probabilities (statistical generalisation). He also states that case studies should not be confused with ethnography which usually require long periods in the field. Yin (2014, p.20) goes on to advise a case study researcher to be rigorous, following systematic procedures, and not allowing equivocal evidence to influence the directions of the findings and conclusions.

Yin (2014, p. 18) distinguishes between two case study strategies; the single case study and the multiple case studies. A single case study approach is chosen because the case is unique or critical while a multiple case study is chosen to allow replication and is likely to produce more evidence (Saunders et. al, 2016, p. 187)

This research has adopted the multiple-case design and in selecting the cases (units of analysis), sampling techniques were deployed. A sample as defined by Bryman & Bell (2015, p.187) is the segment of the population that is selected for investigation. It is a subset of the population. The population in this case being public sector organisations within the Nigerian space industry. Sampling is usually undertaken in research when it is impossible to either collect or analyse all the available data available owing to restrictions of time, money and often access. Sampling techniques enable the researcher to reduce the amount of data needed to be collected by considering only data from a subgroup rather than all possible cases (Saunders et. al, 2016, p.272). The sampling techniques available are divided into two; probability (or representative) and non-probability sampling (Saunders et. al, 2016, p.275).

Probability Sampling is associated with a sample that has been selected using random selection so that each unit in the population has the same chance of being selected. Types of probability samples are; simple random sample, systematic sample, stratified random sampling, multi-stage cluster sampling (Bryman & Bell, 2015, p.187-193, Saunders et.al, 2016, p.287-293).

Non-probability sampling is associated with a sample that has been selected using a non-random selection method, implying that some units in the population are more likely to be selected than others (Bryman & Bell, 2015, p.187). Types of non-probability samples are; quota sampling, purposive sampling, volunteer sampling and haphazard sampling (Saunders et.al, 2016, p. 299-304)

A researcher can decide to use either the probability sampling or the non-probability sampling techniques. Some research projects use a combination of different sampling techniques, whatever the choice, it is dependent on access to individuals or organisations (Saunders et. al, 2016, p.305).

For the purpose of this research, the researcher adopted a non-probability sampling technique. Three types of non-probability sampling technique were used in this study: purposive, convenience and volunteer non-probability sampling techniques. These are discussed:

- Purposive Homogenous Sampling- the purposive sampling technique, sometimes referred to as judgemental sampling because it involves the use of judgement by the researcher, to select cases that will best answer the research questions and meet the objectives. For this purpose, homogenous sampling was used in selecting the two case organisations due to the fact that they are both public sector organisations within the Nigerian space industry and they have embarked on implementing a quality management system within their organisation.

- Convenience Sampling was also adopted. This technique involves choosing cases which are most promptly open to the researcher, for instance through known contacts who consent to take part in the research (Kumar, 2014, p.368). The researcher adopted this sampling technique as both case study organisations that participated in the study were readily accessible to the researcher.

- Volunteer sampling- the researcher used the self-selection sampling technique by allowing individuals within these organisations to identify their desire to take part in the research. For the first case study organisation, participants who chose to be interviewed and complete the questionnaires were identified by the researcher based on their current position within the case organisations. In the second case organisation, due to limited access, participants who chose to be interviewed and complete the questionnaire, were recruited by a gatekeeper. The gatekeeper in this organisation is the head of the customer service unit.

Figure 3.3 below gives an illustration of non-probability sampling techniques with the highlighted boxes representing the specific sampling techniques adopted for this study.
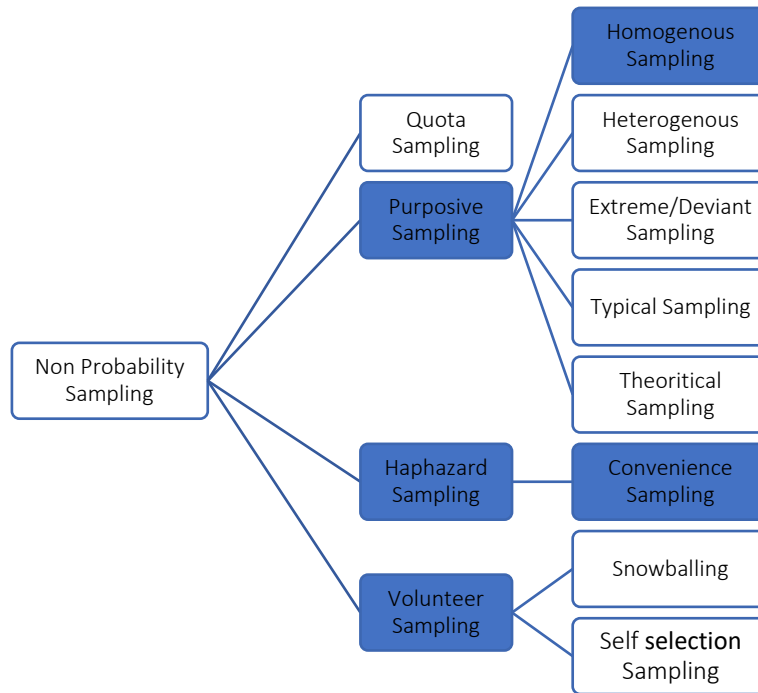
Figure 3.3 Non-probability Sampling Techniques (adapted from Saunders et.al 2016, p.295-303)

Therefore, the research has a sample size made up of two case study organisations. The sample of respondents selected for this research are representatives from organisations which already have a quality management system. The organisations have been selected based on location, which is Abuja, Nigeria. These representatives were made up of management and non-management employees who have spent a number of years in the organisation.

3.2.5 Time Horizon

Cross-sectional or longitudinal time horizons are available for the conduct of research. Cross-sectional research involves the investigation of an event at a specific time on the other hand, longitudinal research is research carried out over an extended time (Saunders et.al, 2016, p. 200). This research is a cross-sectional study with data collected between May 2017 and June 2017, with the researcher visiting both organisations at short intervals. Constraint in access to employees of case organisations had an impact on the time horizon of this study.

3.2.6 Data Collection

For purpose of this study, questionnaires and interviews were adopted. These data collection methods are discussed in this section.

3.2.6.1 Questionnaire

For quantitative data collection, this research made use of questionnaires (see Appendix 7). The questionnaire is a research technique that comprises of statements or questions intended to get responses from respondents to gather essential information to achieve the research objectives (Bajpai, 2011, p. 71). Examining the employees' experience of the implementation of quality management principles is among the research objectives that prompted the collection of quantitative data.

The design of a questionnaire varies according to how it is delivered, returned or collected and the amount of contact with the respondents. The different types of questionnaires include; self-completed questionnaires (internet questionnaire, postal questionnaire and delivery and collection questionnaire) and interviewer-completed questionnaire (telephone questionnaire and face-to-face questionnaire) (Saunders et.al, 2016, p.440). For this research the delivery and collection questionnaire were used where the questionnaire was delivered by hand to the respondents and collected later. This was the preferred method due to an unreliable postal system and a lack of use of email system in the case organisations. However, there are weaknesses in the use of this method such as no influence over who finishes answering the questionnaire, the probability of delay in waiting for respondent answers, incomplete responses, no plausibility of help to respondents and the possibility of a small amount of questionnaires given back to the researcher (Connaway & Powell, 2010, p.147; Collins, 2010, p.128). The researcher took all these issues into consideration and tried as much as possible to limit these weaknesses by preparing an informed consent sheet including information about the questionnaire collection and details of the researcher in case of any inquiry. The researcher also asked the gatekeepers to distribute and collect the questionnaires from each management and non-management level within the organisation.

The design of the questionnaire included two types of questions; Open (sometimes referred to as open-ended) and closed (sometimes referred to as close-ended). Open questions allow respondents to give answers in their own way while closed questions provide a number of alternative answers from which the respondent is instructed to choose (Saunders et.al, 2016, p.452). The questionnaire instrument contained five main sections. The first section contained

demographic information where participants were requested to select their gender, educational level, current position in the organisation and years of experience in the organisation. In the second section participants were requested to assess variables based on literature review related to challenges faced by their organisations. The questionnaire was created using a 5-point Likert quantitative scale to measure participants' opinions (Bartikowski, Kamei & Chandon, 2010, p.180). The rationale for using a 5-point Likert scale is discussed in section 3.2.7.3. To give exact and reasonably estimable answers for the questionnaire, the cut-off value of the Likert scale was set as follows; 1= Strongly disagree, 2= Disagree, 3= Neither agree nor disagree, 4= Agree, 5= Strongly agree. This section also contained an open-ended question to allow the respondents to state other challenges from their view that had not been provided. This part was later analysed qualitatively. In the third section of the questionnaire, participants were asked to select from a number of variables, the improvement approaches of quality management that have been implemented in their organisation. As more than one improvement approach can be implemented, the participants were instructed to select as many as has been implemented. In the fourth section of the questionnaire, participants were requested to assess variables, determined from the literature review of related principles which in their opinion, must be present for the successful implementation of quality management. In the fifth section, participants were again requested to assess variables, determined from the literature review of related of barriers hindering the successful implementation of a quality management within their organisation. This section made use of a Likert type scale with the following labels; 1=Not a Barrier, 2=A weak barrier, 3= I don't know, 4= A strong barrier, 5=A very strong barrier. The variables used in the fourth and fifth sections of the questionnaire were adapted from the research instrument used by Elfaituri (2012).

3.2.6.2 Interviews

Interviews were adopted for this study based on the belief that they give researchers the opportunity to gain insights into how people interpret their surroundings (Ang, 2014, p. 147). The qualitative research methodology recognises three types of interviews: semi-structured, structured and unstructured. Each one of the three forms is suitable for certain types and purposes of research. In this research, interviews were generally semi-structured whereby the interview were largely prepared and followed a structure but also left some possibility to ask follow-up questions, leave out or reorder questions, depending upon the answers (Bryman and Bell, 2015, p.480). This technique depended on a one-to-one individual interview which allowed the researcher to understand, in detail, the opinions of the management and non-

management staff regarding challenges both organisations face, quality improvement efforts and identifying barriers to implementation of a quality management system, to explain any vagueness and enable the participant to verify their responses and prevent any misunderstanding (Klenke, 2008, p. 132; Bowling & Ebrahim, 2005, p. 209).

The researcher used an interview guide (see Appendix 8), which served "*to ensure that the same basic lines of inquiry were pursued with each interviewee*" (Patton, 2002, p.343). An interview guide or schedule was also used during the interviews, to ensure that the researcher did not get carried away and deviate from the original objective of the study. In this research, the interview process was audio taped and notes were taken during the interviews for cross-checking and verifying data against the audio tapes.

3.2.6.3 Rationale for use of Data collection methods

Utilising semi-structured interviews has the advantage of producing rich and detailed data about individual experiences and perspectives, flexibility and use of smaller samples to generate adequate data (Braun & Clarke, 2013, p. 80). This research involved two case studies and therefore produced a small sample size. Using semi-structured interviews however, produced enough data to adequately achieve the objectives of this research. Nevertheless, using semi-structured interviews has limitations which include the possibility of a lack of anonymity, time consuming for the researcher and participants and a lack of breadth (Braun & Clarke, 2013, p. 80). There are also concerns about reliability/dependability, bias (interviewer bias, response bias or participation bias), errors because of poor recall, reflexivity (that is, participant states what interviewer wants to hear) (Yin, 2014, p. 196). Good preparation is key to minimising or overcoming these limitations and Braun & Clarke (2013, p. 90) suggest testing and practicing interview technique with a friend or colleague. This was done by conducting pilot studies with two subject experts (see section 3.2.9.3 below). The researcher made digital recordings and took notes during all of the interviews. The audio recordings were transcribed verbatim to reflect and portray the conversation as realistically and accurately as possible in order to right regular impediments of memory and to allow the assessment of interview participant's statement over and over (Bryman & Bell, 2015, p.481).

The limited time to conduct this research and limited resources, all influenced the choice of the questionnaire techniques to gather participants opinion from the different levels within the case organisations. A five-point Likert scale and Likert type scale were the preferred format for collecting the data because the Likert scale has a mid-point with one side of the scale showing

the strength of agreement and the other side showing the strength of disagreement. The mid-point gives respondents who are indifferent in some cases with their degree of agreement and therefore have no choice except to take the mid-point. The Likert type scale was also designed to provide an option for respondents who do not have a response to a question when completing the questionnaire, therefore the option of I don't know was included in the scale.

Studies such as that done by Dawes, (2008, p.62) agree that reliability and validity are improved by using 5 to 7-point scales rather than 2 to 4 scale points. However, scale points higher than a 7-point scale do not improve reliability and validity further.

The number of scale points affects data characteristics such as the mean score, which is the statistical method used for data analysis in this study. However, Dawes, (2008, p. 72) using 5 point and 7 point scales concluded that data gathered from a 5 point scale format can be readily transferred to a 7 point scale since the rescaled mean score from both formats showed virtually no difference between the 5-point and 7-point formats. This suggested that a 5-point scale for this study would be sufficient.

Moreover, the questionnaire used in this research consisted of five long sections, and so to minimise the frustration levels of respondents and to increase the response rate and improve response quality (Sachdev & Verma, 2004, p.104; Babakus & Mangold 1992, p.771), a 5 point scale point was employed mostly defined as 1 = Strongly disagree, 2= Disagree, 3= Neither agree nor disagree, 4= Agree, 5= Strongly agree.

A 5-point Likert type scale was utilised in the last section of the questionnaire to keep the respondents engaged and avoid respondent fatigue (Ben-Nun, 2008). However, in this section the wording for the 5-point labels was 1=Not a Barrier, 2=A weak barrier, 3= I don't know, 4= A strong barrier, 5=A very strong barrier. The midpoint was labelled 'I don't know' to provide an option for respondents who did not know if it is either a 'strong barrier' or 'a weak barrier'. Studies have shown that respondents have different interpretations of the mid-point of a scale even if labelled (Nadler, Weston & Voyles, 2015, p.71; Sturgis, Roberts & Smith, 2012, p.18). Respondents have interpreted the mid-point to be: Do not know; Unsure; Do not care; No opinion; Neither; Neutral; Both equal parts of agree and disagree; Undecided; Not applicable or Unwilling to answer (Losby & Wetmore, 2012). Sturgis et. al (2012, p.18) suggests coding the mid-point as 'don't know' as their research indicated that a vast majority of the respondents that chose the mid-point interpreted it as 'don't know'. Some examples of studies which have used 'don't know' as the mid-point include; Brislin &Yoshida, (1993, p.296), Burnard, 1997,

p.198), Griffin (2008, p.87) and Nathanson (2010, p.104). Therefore, in this research in the final section of the questionnaire the mid-point in the 5 point Likert type scale was labelled 'I don't know and the numerical value of the mid-point (3) was also indicated to inform respondents the definition and associated value that would be used in analysing of their choice when selecting the mid-point of the scale.

3.2.7 Data Analysis

According to Matthews & Ross, (2010, p. 317), the purpose of data analysis is to describe, discuss, evaluate and explain the content and characteristics of the data that has been collected in a research project.

This study used a quantitative method (questionnaires) for data collection and qualitative method (semi-structured interviews).

3.2.7.1 Analysis of Quantitative Data

For analysis of the quantitative data collected using questionnaires, quantitative data was analysed using statistical techniques to assist in interpreting the results of this study. Selection of the statistical methods for analysing the data was based on the study's objectives, the nature of the data collected and the relationship between the variables used in the questionnaire. Quantitative analysis was done using SPSS (Statistical Package for the Social Sciences version 16.0) software to handle all numerical information produced from questionnaire for both cases in this research. The process of analysing the quantitative data included; descriptive, factor and frequency analysis. Descriptive analysis was used in this study to describe the data and their characteristics. Frequency analysis was used in terms of means to find the respondents' demographic characteristics and analyse the level of implementation of QM factors in the case organisations. Factor analysis was utilized to decrease the large amount of QM variables, and to test the construct validity of research measures (see section 4.1.4). Factor analysis was also used to bring intercorrelated variables together under more general underlying variables called factors which offered the possibility of gaining a clear view of the data and also using the output in subsequent analyses (Field 2013, p.684). To assess the suitability of the respondent data for factor analysis, the Kaiser-Meyer-Olkin (KMO) test was used to assess the sampling adequacy of the data while Bartlett 's test of sphericity was used to measure the correlation among variables (Tabachnick & Fidell, 2007, p.614).

3.2.7.2 Analysis of Qualitative Data

Data analysis in qualitative research consists of preparing and organising the data for analysis through a process of coding and condensing the codes, and finally representing the data in figures, tables or a discussion (Creswell, 2014, p. 180). This was adopted for the analysis of the semi-structured interviews.

3.2.8.1.1 Transcribing the Semi-Structured Interview Data

The interviews were audio recorded and needed to be transcribed carefully and meticulously. Subsequent to transcribing, the researcher read through the transcribed interviews to acquire a general sense of the data and find the codes that be extracted from them for interpretation and construction of meaning.

3.2.8.1.2 Template Analysis of Qualitative Data

Template analysis was adopted to explore employees' perception of the implementation of QM within their organisations. Template analysis is an aspect of thematic analysis focussed on analysing content and uniting similar themes which develop from the transcript. King (2012, p.428) describes template analysis as "*a particular way of thematically analysing qualitative data. The data involved are usually interview transcripts, but may be any kind of textual data including focus group data, diary entries or open-ended question responses on a written questionnaire*". To carry out the analysis, a protocol was used as advised by Creswell & Creswell (2018, p.192). This protocol is described below

Step 1. Familiarise yourself with the data- In this step, the researcher read all the transcripts of the interviews to get a general sense of the information contained in the data and to reflect on interviews' overall meaning.

Step 2. Develop initial key ideas- after reading through the transcribed interviews, the researcher began to develop initial key ideas about the data and to note things of interest as she read along. The development of emerging concepts as related to the research was also done at this stage.

Step 3. Identify specific codes for each concept- To conduct a detailed data analysis, a researcher can decide to use a qualitative computer data analysis program or use hand coding to organise and search for information contained in databases (Creswell & Creswell, 2018, p.192). Coding involves "*sub-dividing the data as well as assigning categories which are*

allocating units of meaning in the form of labels or tags for inferential or explanatory information to help compiling in the study" (Dey,2003, p.144). The researcher made use of hand coding in analysing the data due to the small number of interviews conducted.

Coding categories were developed and attached to different segments of the interview transcripts to categorise and catalogue various groups of words connected to precise answers generated in themes. Identification of themes was based on achieving the research objectives which included identification of factors enabling the implementation of QM and factors acting as barriers to the implementation of QM factors in the case organisations based on the perceptions of employees.

Step 4. Improve the Template- this involved reducing or increasing order of codes or themes. King (2012, p. 426) advises that codes and the template be amended and assembled to give a premise for connections between codes to be made. Therefore, the initial codes generated were modified and arranged in a more suitable manner. Some codes had to be deleted as they were found to be too broad and some other codes were reclassified (King, 2012, p.120). The coding process of the collected data continued thereafter using an improved template.

Step 5. Analyse for Credibility and Dependability - It is also acknowledged that it is difficult to decide when to stop changing the codes but King (2012, p.427) suggests that, all sections of the text should be read through thoroughly about three times to ensure that the template had reached its final stage. This was done by the researcher and once confident with the developed template, four randomly selected transcripts were shared with an independent qualitative researcher to further test the template to ensure the credibility and dependability of the template. After careful review, the independent researcher agreed with most of the codes and themes developed by the researcher and recommended the combination of some theme considering the interconnected narratives on the themes by the interviewees.

Step 6. Finalising the Codes- the researcher was able to develop the final template with the feedback received from independent qualitative researcher (see Appendix)

3.2.7.3 Cross-Case Analysis

Data analysis in this research was carried out for each case organisation independently (see chapter 4 and 5) and then a cross case analysis was carried out to cover both case organisations (see chapter 6) to determine the QM factors critical to QM implementation in the Nigerian space industry.

3.2.7.4 Rationale for Data analysis methods

To meet the aims and objective of the research which includes to better understand the employees' perceptions of QM implementation, it was essential to use a qualitative study to uncover these beliefs and feelings towards quality improvement and gain a better understanding of the phenomenon of attitudes towards the implementation. Also, the use of template analysis offers the freedom of allowing the themes to emerge from the data collected. This is acknowledged as an advantage as there is no set rule but it gives structure to the analysis and further adds credibility to the findings; it offers the framework and layout upon which the analysis can be developed. King (2012, p. 427) expands on this by stating that "*although the practice is required within template analysis, the methods are more flexible and offer the researcher more choice and freedom of interpretation and this flexibility allows researchers to tailor the analysis to match their own requirements*".

However, limitations of template analysis need to be highlighted. It has been described by King (2012, p. 123) as too prescriptive and that keeping to the strict regime of data collection and coding would not leave the data sufficiently open to exploring its truth. Nevertheless, this method of analysis can be considered an advantage because it allows the truth in the data to emerge without interference. King (2012, p.428) advises that the researcher "*must remember that there are no absolute rules here; in the end, you must define an approach to analysis that suits your own research*"

Using Factor analysis is considered to be particularly useful with multi-item instruments designed to measure personality, attitudes, behavioural styles, and other multifaceted constructs. In this research, this was considered useful as the questionnaire contained forty-five variables designed to identify and measure the QM implementation factors in two case organisations. The focus of the analysis was to determine the number of factors that account for quality improvement in the case organisations. Some limitation with factor analysis highlights the point that in reducing the original variables into a smaller number of factors, some information is lost, especially, when the number of extracted factors is less than the original number of variables, then the factors do not clarify all the variance of the original variables (Grice, 2001, p. 430; Zuccaro 2007, p.513; Breivik & Olsson, 2001, p.170). However, by extracting a few linearly independent factors, factor analysis provides a method to allow the information in the correlated variables to be included in the regression. More so, this statistical method determines the importance of each of the variables in making up factors, rather than

leaving it to the personal biases of the researcher (Greene, 2003, p.366; Cahill & Sánchez, 1998).

Factor analysis was not the appropriate technique for the analysis of the barriers because it is a tool for identifying the underlying factors which are considered critical to a concept. Factor analysis reduces dimensions of correlated variables bringing them together under a set of more general underlying variables which are usually called factors. The number of factors identified can be many or few depending on the number of variables used for the analysis. While factor analysis could have been used to identify the barriers, that are critical to hindering the QM implementation process in the Nigerian space industry, it could not be used to rank those barriers in order to tell which of them is having the greatest or least impact on the QM implementation process. So, for example, factor analysis can identify seven barriers that are critical barriers such as; lack of funds, lack of facilities, lack of infrastructure, lack of management commitment, lack of performance measurement, lack of training and lack of customer focus as critical barriers to QM implementation in an organisation but factor analysis does not identify which these factors is having the major impact as a barrier. Committing resources to eliminate the major barrier among seven barriers will have more effect on the QM implementation process than using the same resources to tackle a barrier which might have the lowest impact among the seven barriers identified by factor analysis.

Identifying barriers to QM implementation and ranking them from greatest barrier to least barrier is important for top management of public organisations that have limited resources and have to eliminate the barriers to QM implementation in order to be successful. It is also important for policy makers to be able to easily identify the top most critical barriers and the least critical barriers and to understand areas to commit public resources to in order to support public sector organisations in their quality improvements efforts (Jacobson, 2008, p.8)

3.2.8 Research Evaluation

This section presents the steps taken to ensure the trustworthiness of this research. The key aspects which are used to test research quality are classified by Matthews & Ross, (2010, p. 7) into four key aspects; reliability, validity, credibility and ethical practice. Yin (2014, p.45) classifies them as construct validity, internal validity, external validity and reliability. Bryman & Bell (2015, p.168) classify them into two, having subgroups; Reliability (stability and internal reliability) and Validity (face validity, concurrent validity, predictive validity, construct validity and convergent validity).

3.2.8.1 Reliability

Reliability '*refers to the consistency of the measure of a concept*' (Bryman & Bell, 2015, p.169). Meaning that research should be done in such a way that when another researcher carries out the research in the same way, they would expect to obtain the same results or if the research is carried out again by the original researcher, they would expect to obtain the same findings (Matthews & Ross, 2010, p. 53; Yin, 2014, p. 50).

Yin, (2014, p. 49) explains that the goal of reliability is to minimize the errors and biases in a study. Reliability in qualitative research has been described by Stenbacka (2001, p. 551) as "*a quality concept which has to be solved in order to claim a study as part of proper research*". With quantitative data on the other hand, reliability focuses on the consistency of results and the robustness of the measures (Cooper & Schindler, 2003, cited by Quinton & Smallbone, 2006, p. 130). Robson (2002, cited by Saunders et. al, 2009, p. 156) describes four threats to reliability, they are; participant or subject error, participant or subject bias, observation error and observation bias. There are also some threats related to data collection such as failure of participants to answer questions, giving several answers to the same question and writing comments on the margin of the questionnaire which all indicate a lack of reliability (Ihantola & Kihn, 2011, p.43). Maxwell (2005, p. 108) stated that researcher bias and the influence of the researcher are threats to the validity of a research.

Different statistical tests are available which are used to evaluate the reliability of quantitative data such as Cronbach's alpha coefficient and test-re-test. With test-re-test, a test is administered to a sample of respondents on one occasion and the re-administered to the same sample on another occasion to measure the correlation in respondents' answers (Bryman & Bell, 2015, p.168). Cronbach's alpha coefficient is broadly utilised as a measure of internal consistency or reliability involving computing mean reliability coefficient estimates, in which the reliability coefficient ranges from 0.679 to 0.893, indicating validity of the dependent and independent variables (Tavakol & Dennick, 2011, p.53). The Cronbach's alpha coefficient was the statistical test used by the researcher to test the reliability of the quantitative instrument used in this research. According to Nunnally & Bernstein (1994, p. 265), Cronbach's alpha is defined as "*the ratio of the sum of the covariance among the components of the linear combination (items), which estimates true variance, to the sum of all elements in the variance covariance matrix of measures, which equals the observed variance*". The Cronbach's Alpha is used to determine whether the survey instrument is reliable, and the data collected can be

used for further analysis (see section 4.14). Further analysis can only be carried out if the Cronbach's Alpha test is passed (Lawrence, 2017, p.7).

3.2.8.2 Validity

Validity '*refers to the issue of whether or not an indicator (or set of indicators) that is devised to gauge a concept really measures that concept*' (Bryman & Bell, 2015, p.170). The terms Credibility, Conformity or Neutrality, Dependability or Consistency and Transferability or Applicability, are the essential criteria for the quality of qualitative research (Riege, 2003, p.81-82). Yin (1994, p.10) suggests the need to adopt well-established research methods in the qualitative investigation and Krefting (1991, p. 216) considers a qualitative study to be credible or valid, when it presents an accurate description or interpretation of human experience that people who also share that experience would immediately recognise.

Before conducting the interviews, the researcher met the supervisory team for debriefing sessions to discuss the interview process, share ideas and discuss alternative approaches. The debriefing sessions served as an opportunity to develop idea, recognise biases and preferences and the best way to work around them. In addition, an independent qualitative researcher was also contacted to test the template for the analysis which further justifies the credibility of the research (Chenail, 2011, p.1720; Barriball & While, 1994, p.330)

To ensure that the participants provided credible information, they were given opportunities to stop the interview without needing to provide any reason for doing so and prevent them from feeling indebted to take part. It was also emphasised that it was completely their own decision to take part in the interviews. This ensured that only those who were truly willing to participate and to freely give information, were interviewed.

This study's mixed method approach also improved the reliability and validity of the research. To address the threats to the reliability and validity of the research, the researcher conducted a pilot study. The time for distribution of the questionnaire was also considered, the researcher avoided distributing the questionnaires during the holiday period. The questionnaire instrument used to collect quantitative data was first examined by two experts who have experience in the research topic. This led to modification of the survey format and some of the questions (see section 3.2.7.2) The questionnaire was then piloted to a group of participants to assess the clarity of the questions, this also led to modification of a question in the questionnaire. There was also a pilot of the semi-structured interviews (see section 3.2.7.1). Therefore, all the data collection techniques were piloted and tested to improve the quality of this research. Also, the

researcher avoided asking leading questions and informed the participants of their choice to respond or refuse to respond to an interview question. Furthermore, adopting triangulation by utilising two data collection methods, improved the validity and reliability of this study.

The background, qualifications, and experience of the researcher also contribute towards the reliability and validity of the research as the researcher plays a prominent role in collecting and analysing the data (Shenton, 2004, p.68; Patton, 2015, p.710). Information about and the position of the researcher, in the context of this study, is presented within the reflexivity section (section 3.2.9.5) which also includes efforts in evaluating the project repeatedly as it develops. This conforms with the idea of progressive subjectivity by Guba and Lincoln (1989, p.238) which involves observing how the researcher has developed over the period of the study.

3.2.8.3 Pilot Studies

A pilot study aims to determine if there are any issues or limitations within the data collection design and to ensure that research instruments are well designed (Bryman & Bell, 2015, p.273). This process lets the researcher to evaluate the selected data collection techniques and make required modifications before carrying out the research. Semi-structured interviews and questionnaires were the data collection techniques utilised for this research.

Two pilot interviews were conducted with two experts in the subject area to guarantee that the interview questions were fitting and that the time set for the meetings was satisfactory (Silverman, 2013, p. 206; Creswell, 2014, p. 165). The pilots identified some flaws in the questions, it was recommended that the interview questions be broken down and made more simpler form with the researcher probing the participants using phrases like "Why were they adopted?" "Can you please describe?" The pilots encouraged the use of such probes during the interviews, as it would enable the researcher to obtain in-depth narratives of events and provide in-depth details. Furthermore, the pilot enabled the researcher to establish the timeframe for the interview to be between thirty minutes to about an hour depending on the interviewee because it is possible for employees of the case organisations to have a varied knowledge on the implementation of a quality management system.

The questionnaire was also pilot tested by participants who work in one of the organisations used in the study. Ten questionnaires were distributed and upon collection, there were alterations necessary in two of the sections. It was pointed out that one question in the fourth section of the questionnaire had been repeated and some of the respondents pointed out that they were not aware of the QM improvement initiatives being implemented in their

organisations and no option had been provided in the questionnaire for that purpose, therefore this option was included in the final questionnaire. The researcher also ensured that the ten employees who completed the piloted questionnaires did not complete the final questionnaires by informing them that they could not and should avoid completing another questionnaire as this would introduce bias. (Saunders et.al, 2016, p.473; Teijlingen & Hundley, 2001, p.34)

3.2.9.4 Triangulation

Triangulation refers to the use of more than one method of gathering data to address the same research question (Matthew & Ross, 2010, p.146). According to Yin (2014, p.122) "*the use of multiple sources would increase confidence that your case study had rendered the event accurately.*"

There are five types of triangulation. They include; data triangulation-making use of alternative techniques to measure the same concept; researcher triangulation- refers to more than one researcher using the same sources; theory triangulation- using multiple approaches to interpret a single set of data; methodological triangulation- focuses on mixed methods of quantitative and qualitative data (Hair, Wolfinburger, Money, Samouel & Page, 2011, p. 289) and environmental triangulation- based on using different settings, locations and other environmental factors that have influence on the information that has been received during the study (Guion, Diehl & McDonald, 2011, p.2)

There are several benefits in using triangulation for research such as increased confidence in the research, improved accuracy and production of complementary data that completes the findings of the research (Denscombe 2014, p. 139; Hair et.al, 2011, p. 289). However, there are some limitations to triangulation such as it is time consuming, complexity of data analysis, and the potential risk that data coming from one perspective does not support other perspectives (Denscombe 2014, p. 139). All these limitations were taken into consideration by the researcher in the mixed methods design of data collection and analysis which further enhanced the validity and reliability of the research.

3.2.8.5 Reflexivity

Reflexivity refers to the awareness of the researcher about her role in influencing the research outcome due to prior assumptions and experiences. Reflexivity has been regarded by authors as an important feature to be considered at different stages of the research process, that is prior to, during, and after the study (Saunders et.al, 2016, p.125; Bryman, 2012, p.394; Finlay, 2002,

p.212). According to Holloway & Biley, (2011, p.971) it is important to include some background information about the researcher as part of the thesis considering that the researcher is the key research instrument of the research. Being reflexive in research is important but can be challenging as acknowledged by Langdridge (2007, p.59) who suggests that even though there are no laid down principles or guidance on how to evidence reflexivity, it is recommended that reflexivity should be done before, during and at the end of the research, which will enable alterations to be made if required. More so, Riege (2003, p.77) states that discussing reflexivity makes the research more dependable. Following these suggestions, this section discusses the reflexive considerations made by the researcher to promote a degree of openness and transparency of the research.

3.2.8.5.1 Standpoint as a Researcher

The researcher is a Nigerian who obtained her undergraduate degree in Chemistry from a Nigerian University and an MSc in Technology Management from the University of Portsmouth, UK. Her work experience has involved undertaking a six months internship in a quality control department of a manufacturing company in Nigeria and working for five years in the total quality management unit of a public sector organisation in Nigeria. As the researcher chose to examine an organisation in which she has prior work-experience, and has an internal perspective of, it is possible that the background and experience of the researcher could have influenced decisions and interpretations made during the study. Her pre-understanding of the case organisations may have affected her choices in designing the questionnaire and interview topics and the overall perception of both organisations. However, the researcher had only worked in one of the case organisations for five years, she does not claim that she has complete understanding or knowledge of both case organisations. The risk with the researcher having experience from the one of the case organisations was that she could neglect other areas of which she had no insight and only focus on those she had. However, this risk was minimised by examining literature and utilizing the information found in literary sources to cover the areas of the organisation which were of interest. Another risk is the fact that the researcher is an employee of one of the organisations in this study and therefore could hesitate on criticism in order not to jeopardize her position in the organisation. However, she has employed ways not to be biased by anonymising the organisations and presenting the results as they are, based on her theoretical research and not how the organisation would like them to be. The researcher has presented below, the various reflexive steps taken at the beginning, during and on completion of the study.

3.2.8.5.2 Reflexions at the beginning of the Study

On commencing the research, the researcher acknowledged that it would not be possible to separate her values and assumptions towards the phenomenon being researched due to circumstantial context and because of this, an interpretivist paradigm was also adopted to explore the participants' perceptions towards quality management implementation. By acknowledging her background before the study, the researcher established an effort towards ensuring a degree of honesty and transparency, and consequently encouraging a reflexive approach to the study.

3.2.8.5.3 Reflexions during the Study

Reflexive efforts were made during the research through enormous support received by the researcher's supervisory team. Guidance and directions were provided during regular meetings and also communicated through emails. The researcher was challenged on her decisions and learnt very quickly to provide justifications for all decisions she made for the study.

To further ensure honesty and openness during the research, a draft of the questionnaire and interview guide were presented to the supervisory team, and the research instruments were discussed at a meeting where the supervisors offered their feedback. For the questionnaire, the researcher was asked to justify why she had chosen certain structures for her question like a 5-point Likert scale instead of a 3- or 7-point Likert scale (see section 3.2.7.2) and some questions had to be removed as they were seen to be repetitive. For the interview guide, the feedback led to the removal of some questions as they were seen to be leading questions. In addition to the feedback provided by her supervisory team, the researcher carried out pilot studies with the questionnaires and conducted interview sessions prior to the main interviews. The feedback from the participants in the pilot study led to a further revision of the questionnaire and interview guide. This pilot studies made the researcher to develop a better understanding of her position as a researcher. She became more confident and felt more reassured as she approached potential participants with a clear questionnaire and interview guide.

The researcher was also able to develop her data analysis skills during the study as she faced the challenge of learning the process of data analysis, drawing insights from data and presenting her findings in a way would be easy for readers to understand. During the process of data analysis, the researcher was able to use various statistical tests to validate her data and test that her quantitative research findings were reliable (see section 4.1.4). The researcher also

corroborated with experts in statistical techniques and qualitative analysis to enhance the validity, reliability, authenticity, replicability, and accuracy of her research findings.

3.2.8.5.4 Reflexions on Completion of the Study

After three years of being involved with this research, there is no doubt that the researcher has learnt a lot —with the guidance from her supervisory team. Her research skills, academic writing style and understanding have improved. With this thesis she has been able to contribute to knowledge and provide a better understanding of quality management implementation in the context of the Nigerian public sector organisations.

Coming to the end of this research, the researcher is confident to say she has improved from being a research student basically following the instructions of her supervisory team to taking charge and responsibility for the research. She has indeed developed from being a research student to becoming an academic researcher.

3.3 Ethical Considerations

The researcher must be aware of any possible harm, risks, disrespect, mistreatment and deceptions by the processes, the practice and the questions of the research to the participants (Eriksson & Kovalainen, 2008, p. 62). An ethical review allows the researcher to conduct a brainstorm of any possible ethical issues that might arise in the process of carrying out the research. The researcher considered ethics at all phases of this research, as against the common misconception that ethical issues only arise at the data collection process (Creswell, 2014, p.92). There was the use of all conceivable avenues to ensure the consideration and attending to all anticipated ethical requirements. This was done with the support of research supervisors and University of Portsmouth Ethical Review Checklist for Staff and Doctoral Students. The ethical application for this research was sent to the Faculty Research Ethics Committee (FREC) from which a favourable ethical opinion and guidance was received (Reference number E496).

3.3.1 Seeking Informed Consent

In addition to the ethical requirement for this research, Letters of Invitation and Consent forms (See Appendices 5, 6, 9 and 10) were prepared to disclose the purpose, aim and objectives of the research and emphasise the volunteerism of their participation.

Seale (2004, p.512) is of the opinion that informed consent is a crucial aspect of any research, as the participants need to be sure that they will be treated with respect. In light of that,

measures were taken to ensure informed consent to participate. Before answering the questionnaire and prior to the interviews, participants were provided with the informed consent forms that informed them that participation was optional both for the interviews and questionnaire and they had the right to withdraw from the research at any time before the data was analysed. All participants who took part in the interview sessions gave permission to be audio recorded.

3.3.2 Protection of participants

Ethical guidelines were followed to protect participants from risk (Babbie, 2015, p.65). Contact details of the researcher were also provided on the invitation letters, giving the participants the researcher's phone number and email address, notifying them to contact the researcher if they had any questions about the research before and after the interviews or answering the questionnaire. Moreover, neither the case organisations nor the participants incurred any costs from participating in this research.

3.3.4 Ensuring Confidentiality and Anonymity

To protect the identities of participants and ensure confidentiality, participants where not asked to provide personal information. Additionally, there was a change of the names of case study organisations and all interview participant names to maintain anonymity. Questionnaires were also completed anonymously, as this was one of the conditions given for consenting to take part in the research. Participants were also informed that the Examiners, Supervisor and other representatives of the University might have access to the anonymised transcripts. Furthermore, participants were informed of the likelihood of using their words for publications following the completion of the study, but they were guaranteed that their identity would be disguised. Additionally, participants were informed that the data collected via the interviews and questionnaire, will be stored in a password- secured format on the University's server.

3.4 Summary

This chapter discussed the key aspects of the methodology used in this research in terms of the research design, philosophy, approach and methods using the "Research Onion" by Saunders et. al (2016, p.124) The research made use of questionnaires and semi-structured interviews as the methods for data collection; the rationale of this choice has been clarified and justified in this chapter. This chapter also explained how the pilot study was conducted to ensure the validity of the questionnaires and interviews. The process of the fieldwork was also explained

in terms of the distribution and collection of questionnaires and semi-structured interviews. In addition, the chapter discussed reliability and validity, as well as the statistical methods used in the data analysis to achieve the objectives of this research. Data analysis and the research findings are be discussed in the next chapter.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION: SD ORGANISATION

4.0 Overview

This chapter analyses and discusses the quantitative and qualitative data obtained from questionnaires and semi-structured interviews in the first case organisation named SD for the purpose of this study.

This chapter has been divided into three parts; Part 1 presents the quantitative analysis of data collected using questionnaires in this organisation. Part 2 presents the qualitative analysis of data collected using interviews and part 3 is the discussion of the findings of the quantitative and qualitative analysis of the questionnaires and interviews.

4.1 Organisational Context: SD

SD is a public organisation that is charged with research and development in all aspects of satellite technology. SD has 326 employees who work on the development and delivery of satellite technology services to the citizens of Nigeria. The organisational structure of SD is a traditional bureaucratic structure, with vertical management layers that include; senior management, middle management, lower management and non-management staff (source: Administrative staff, SD). This type of traditional bureaucratic structure is characterised by top-down, hierarchal, centralised and formal communication (Cordellaa & Iannacci, 2010, p.54; Haque, Pathrannarakul & Phinaitrup 2012, p.137). At the time of this study, SD has a quality system in line with the organisations quality policy which aims to achieve excellence in research and development by complying with national and international standards and continuous improvement of the organisation's processes (source: Head of Quality Management Unit, SD)

4.1.0 Questionnaire analysis

The overall organisation of this part of analysis begins with the respondents' demographic information. The second section presents a descriptive analysis of what is perceived by respondents to be the quality improvement technique(s) implemented within the organisation. The third section presents the results of factor analysis, content validity and reliability tests for the variables used in this study to identify the critical success factors of Quality Management (QM) implementation. The fourth section is an analysis of the level of implementation of QM

within SD and the difference in perception of the level of implementation of QM across the different management levels within SD. The fifth section describes the external barriers hindering the implementation of QM in SD organisation and the last section describes the internal barriers to QM implementation within this organisation.

4.1.2 Characteristics of the sample

To break down the questionnaire data, descriptive statistics pertaining to the respondents' profiles, were utilised. These concerned different demographic factors such as gender, age, educational level, position in the organisation and years of experience within the organisation[1] as shown in Table 4.1.

1. Gender - Table 4.1 shows that 71% of 68 respondents are male and 29% are female in this study.

2. Age of respondents- Table 1 also shows that 46% of the respondents are aged between 21 and 30, 40% were aged between 31 and 40, 13% were aged between 41 and 50, while 1% was aged between 51 and 60. This information indicates that most of the employees in this study sample are aged between 21 and 40 years old (86%).

3. Level of Education- As shown in Table 4.1, 6% have a diploma, 31% have a bachelor's degree 54% have a master's degree and 9% have a doctoral degree.

4. Current Position- Regarding the spread of respondents by management level, Table 4.1 shows that 7 % of the respondents were senior managers, 56% were middle managers, 22% were lower managers and 18% were non-management staff. This result indicates that the all levels of management within this organisation are represented in this study.

5. Years of Experience- Table 4.1 shows that 15% of the respondents have < 5 years' experience, 84% have 5 to 10 years' experience, 1% have 11 to 15 years' experience within the industry. This result indicates that the respondents in this sample have adequate experience within the organisation to be able to provide information on QM implementation, as most (85%) of the staff have worked in SD for over 5 years.

Table 4.1 below summarises results of the demographic information from both case organisations

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[1] Exhaustive enquires to collect comparative data for the whole of SD have not been successful

Table 4.1: Demographic information of respondents from SD (author's compilation)

1. Gender	Frequency	Percentage
Male	48	71
Female	20	29
Total	68	100%
2. Age		
21-30	31	46
31-40	27	40
41-50	9	13
≥ 51	1	1
Total	68	100%
3. **Educational level**		
Diploma	4	6
Bachelor's degree	21	31
Master's degree	37	54
Doctoral degree	6	9
Total	68	100%
4. **Position of respondents**		
Senior management	5	7
Middle management	38	56
Lower management	15	22
Non-management	10	15
Total	68	100%
5. Years of experience		
< 5 years	10	15
5- 10	57	84
11-15	1	1
16-20	0	0
Total	68	100%

Observations from the demographic information;

- The results showed that 86% of the respondents in this organisation were aged between 21 and 40 years at the time the data was collected.
- 9% of the respondents have a doctoral degree, while over half of the respondents (54%) have a master's degree.
- Over half of the respondents (56%) are middle managers.

- 85 percent of the respondents have over five years' experience within this case organisation.

These statistics indicate that the study population is well educated and probably had little or no challenge in completing the questionnaires. It also indicates the possibility that the perceptions of the middle managers might have a greater impact than those of other groups on the overall results from this organisation.

4.1.3 Results regarding Quality Management techniques implemented in SD for quality improvement.

This section presents the results of the QM technique/techniques perceived to be implemented for quality improvement in SD. Respondents were asked to identify a technique or techniques that are being implemented, where more than one technique could be identified by a respondent. The technique with the most points was judged by the researcher, to be the most recognised QM technique perceived by employees to be implemented by the organisation. Respondents were also provided with the opportunity to add other QM techniques that had not been already stated in the questionnaire. The results are presented in Table 4.2 below;

Table 4.2: Quality Management techniques implemented for quality improvement in SD as perceived by respondents (source: The Author)

Quality Management Techniques	Response	Percentage
Quality control/Quality assurance	37	49%
I do not know	13	17%
TQM	11	15%
Quality circles	5	7%
Lean management	4	5%
Just-In-Time	4	5%
Lean Six Sigma	1	1%
5S	1	1%
Six Sigma	0	0
Total	76	100%

In total, 76 responses were gotten. Quality control/Quality assurance ranked number one as 49% of responses indicated that it is a QM technique implemented in SD. 17% responded that they do not know the QM technique implemented in SD. 15% of the responses indicated that TQM is a QM technique implemented in SD. 7% of the responses indicated that Quality circles is a QM technique implemented in SD. Lean management and Just-in-time each had 5%, while Lean Six-sigma and 5S each had 1% of the responses. Six Sigma did not get any response.

This result indicates that SD might have adopted Quality control/Assurance as the main technique in implementing QM initiatives in the organisation. The data for this study was collected across the different departments in the organisation, therefore, it is possible that

certain departments have also adopted certain QM techniques in order to carry out projects within their units or departments leading to the selection of the different QM techniques. As discussed in section 2.5, organisations can combine different QM approaches (by implementing different techniques) and tailor them to meet the needs of their organisation (Stringham, 2004, p.185; Mansour & Jakka, 2013, p. 101). This finding is further discussed in section 4.3.1 below.

4.1.4 Factor Analysis

This section assesses the responses obtained from the questionnaires using factor analysis to establish the success factors of QM implementation in SD.

Hair Jr., Celsi, Money, Samouel & Page (2011, p.386) define factor analysis as a multivariate statistical technique that can condense the information from a large number of variables into smaller number of factors. Factor analysis is used to determine the number of distinct constructs assessed by a set of measures (Fabrigar & Wegener, 2011, p.4). These unobservable constructs presumed to account for the structure of correlations among measures are referred to as factors. Factor analysis provides information about the number of common factors underlying a set of measures. It also provides information to aid in interpreting the nature of these factors. (Fabrigar & Wegener, 2011, p.4; Hair et.al, 2011, p.388). One major use of factor analysis is to condense data, making it manageable without losing any of its significant data, in this way making it simpler to test theories (Field, 2013, p.666).

To carry out the factor analysis, a six-step protocol was developed to show the decision pathway for the analysis. The six-step protocol is shown in figure 4.1 below;

```
┌─────────────────────┐
│   Determine data    │
│  suitability for    │
│  factor analysis    │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Factor extraction  │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ Select criteria to  │
│  assist in factor   │
│     retention       │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│  Select rotation    │
│      method         │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ Conduct Reliability │
│     analysis        │
└─────────────────────┘
          │
          ▼
┌─────────────────────┐
│ Interpret and label │
│      factors        │
└─────────────────────┘
```
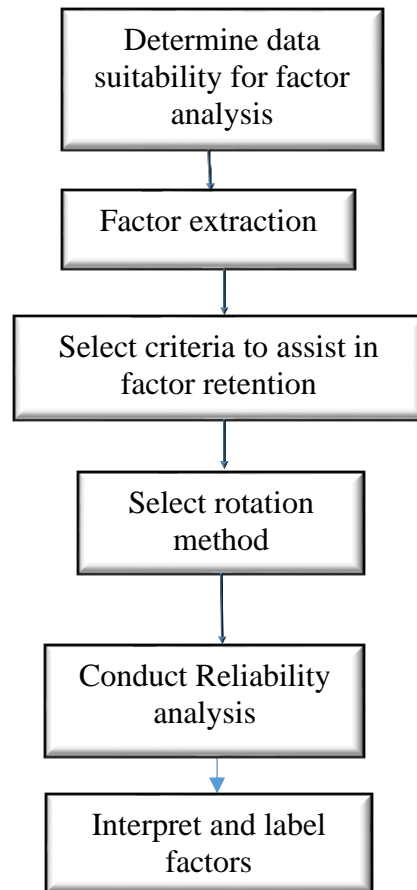
Fig. 4.1. A Six step Factor Analysis Protocol (by Author)

The Statistical Program for Social Sciences (SPSS) was used to carry out the analysis for this study. Each of the steps listed in the protocol will now be explained in more detail.

Step 1: Determine data suitability for factor analysis

To conduct a reliable factor analysis, the questionnaire was first examined to determine if the data is suitable for conducting a factor analysis. There are different ways of determining the suitability of data for data analysis. Two of which are; Sample Size and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy/Bartlett's Test of Sphericity (Williams, Onsman & Brown, 2010, p.4)

  i. Sample Size- the sample size of the data is important in determining the suitability of a data set for factor analysis because as the sample size increases, the sampling error is said to reduce and the factor analysis becomes more stable and accurate (MacCallum, Widaman, Zhang & Hong, 1999, p.90). However, there is a lack of agreement among authors on what sample size is suitable for factor analysis which has resulted in several

guides available in literature (Sapnas & Zeller, 2002, p.135; Hair et al, 2011, p.388; Tabachnick & Fidell, 2007, p.602; Comrey, 1973, p.100). Sapnas and Zeller (2002, p.135) suggest that having a sample size of 50 may be sufficient for factor analysis, Hair et al (2011, p.388) proposes having sample sizes of 100 or greater, Tabachnick and Fidell (2007, p.602) recommend having a minimum of 300 cases for factor analysis while Comrey (1973) proposes having 100 sample size as poor, 200 sample size as fair, 300 sample size as good, 500 sample size as very good, and 1000 or more sample size as excellent. Other authors such as MacCallum et.al (1999, p.91) argue that sample sizes can be reasonably small when communalities are high (that is at least 0.7) and each factor is overdetermined by having a number of variables that are at least several times the factors while Guadagnoli and Velicer (1988, p.274) found that solutions with correlation coefficients >0.80 require smaller sample sizes. As can be seen, a variety of suggested sample sizes required to complete a factor analysis are available in literature and given that the sample size is 68, the analysis was carried out based on the suggestions of MacCallum et.al (1999, p.91) and Guadagnoli et.al. (1988, p.274)

ii. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy/Bartlett's Test of Sphericity- to assess the suitability of the respondent data for factor analysis, the Kaiser-Meyer-Olkin (KMO) tests the sampling adequacy of the data while Bartlett's test of sphericity measures the correlation among variables. According to Field, (2013, p.684), *"The KMO represents the ratio of the squared correlation between variables to the squared partial correlation between variables."* The range of the KMO index is from 0 to 1. The minimum recommended value for a valid factor analysis is 0.50 (Hair, et.al, 2011, p.386). Field, (2013. p. 684) postulates that when the KMO is close to 1, a factor analysis will yield distinct and reliable factors. KMO values below 0.5 are unacceptable, values in the 0.5s are miserable, values in the 0.6s are mediocre, values in the 0.7s are middling, values in the 0.8s are meritorious and values in the 0.9s are marvellous (Field, 2013. p. 684). The KMO index, is particularly recommended when the sample to variable ratio is less than 5:1 (Williams, et.al, 2010, p.5) as is the case with this study. According to Tabachnick and Fidell (2007, p.614), the Bartlett's test of sphericity should be significant at ($p < 0.05$).

For this study the KMO/ Bartlett's test of sphericity has been used to determine the suitability of the data for factor analysis, particularly as the sample to variable ratio is less than 5:1. The study has a sample size of 68 and 45 variables. The result of the KMO was greater than 0.5 at 0.837and Bartlett's test of sphericity had a significance of ($p = 0.000$) Meaning that the data

was fit for factor analysis and there was a significant correlation among variables as shown in Table 4.3 below.

Table 4.3: KMO/Bartlett's test of sphericity (source: The Author)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.837
Bartlett's Test of Sphericity	Approx. Chi-Square	3341.932
	df	990
	Sig.	.000

Step 2: Factor extraction

Factor extraction aims to reduce a large number of variables into factors. There are several ways to extract factors, some of which are; Principal components analysis (PCA), Maximum likelihood, Generalized least squares, Alpha factoring, Unweighted least squares, Principal axis factoring (PAF) and Image factoring (Williams et. al, 2010, p.6). Every one of these extraction methods differ mathematically, based on control of the correlation matrix to be analysed.

PCA was the method used for factor extraction in this study due to the following reasons; PCA is a technique used for reducing the dimensionality of a set of data, increasing interpretability but at the same time minimizing information loss (Jolliffe & Cadima, 2014, p.1). It is an exploratory technique that optimises data to extract real factors which are also referred to as components (in this case, components of quality management) while the other ways of factor extraction look to reveal hypothetical factors that are assessed from the observed data yet are not totally characterized by those data (Widaman, 1993, p.264; Youngblut, 1993, p.122). It is also suggested to use PCA as a factor extraction method when no previous model exists which is one of the objectives of this study, to develop a model to facilitate the implementation of quality management in Nigerian PSOs in the space industry (Williams et. al, 2010, p.6).

Step 3: Select criteria for retaining factors

There are many approaches for retaining factors after factor extraction. Williams et. al, (2010, p.4) suggested that multiple approaches be used in retaining factors. Therefore, for this study the following criteria were used: the cumulative percent of variance extracted, Kaiser's criteria (eigenvalue > 1 rule) and the Scree test which are discussed below;

i. Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1)

The results of the Cumulative Percentage of Variance and Kaiser's rule are both displayed on the same table in SPSS. The cumulative percentage of variance is based on retaining the components which capture a percentage of the variation which could be 50%, 70% or 90% (Hair et. al, 2011, p.122). In the social sciences, the explained variance is commonly between 50-60% (Williams, et.al, 2010, p.4; Hair et. al, 2011, p.122). The Kaiser's rule (eigenvalue > 1) is based on the principal of retaining components which have a greater than or equal power to explain the data than a single variable (Rea & Rea, 2016, p.2). Table 4.4[2] below indicates a cumulative percentage of variance of 76% (meaning that there are more than enough factors to meet the specified percentage of variance explained. This highlighted on Table 4.4) and a total of seven factors have an eigenvalue > 1.

Table 4.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1)1 (Source: The Author)

Total Variance Explained				
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	22.451	49.891	49.891	16.660
2	4.621	10.269	60.160	13.951
3	2.017	4.483	64.643	13.139
4	1.811	4.024	68.668	13.007
5	1.383	3.073	71.741	15.065
6	1.264	2.809	74.550	11.240
7	1.086	2.414	76.964	3.369

This result indicates that seven factors could be retained from the analysis.

ii. Scree test

Interpreting scree plots is based on looking for a change in behaviour in the plot of the variance explained (Rea & Rea, 2016, p.2). This interpretation is subjective, and generally depends on the researcher's judgement (Williams's et.al, 2010, p.7). According to Hof (2012, p.5) "*the factors with values above the point at which the curve flattens out should be retained. The*

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[2] Table 4.4 is a reduced table showing eigenvalue > . The full table can be found in Appendix 11.

factors with values at the break point or below should be eliminated". Thus, looking at Figure 4.2 below, seven factors should be retained.
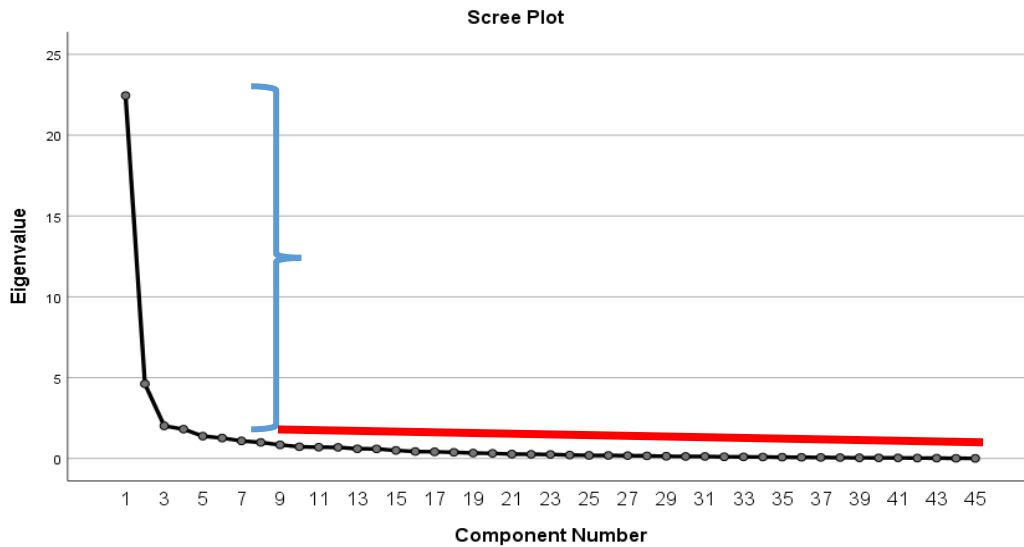
Figure 4.2: Scree plot 1 (by Author)

According to the Cumulative Percentage of Variance, Kaiser's rule (Eigenvalue > 1) and Scree plot for the data set used for this study, seven factors could be retained for interpretation. However, the result is presented in a format that cannot be interpreted (in most cases) therefore, the result is rotated to produce a more interpretable and simplified solution (Zhang & Preacher, 2015, p.583). The next step therefore involves selecting the best rotation method to achieve better interpretation.

Step 4: Select Rotation Method

Rotation of the factor structure is done in order to extract significant data that accurately denotes the underlying nature of the data (Zhang & Preacher, 2015, p.583). There exist two broad rotation methods: Orthogonal rotation and Oblique rotation. SPSS provides five rotation methods, which include: varimax, direct oblimin, quartimax, equamax, and promax. Three of these are orthogonal (varimax, quartimax, & equimax), and two are oblique (direct oblimin & promax) (IBM knowledge centre, 2019)

Orthogonal rotation technique produces factors that are uncorrelated while oblique rotation produces factors that are correlated and are believed to generate more accurate results for research involving human behaviours (Williams et. al, 2010, p.10).

When rotation is done, each variable aligns with other variables that it shares a relationship with. The nature of relationship is made clear by providing estimates of the strength and direction of influence each of the common variable exerts on each of the measures being examined. Such estimates of influence are usually referred to as factor loadings. According to Fabrigar & Wegener, (2011, p.4) "*a factor loading represents the correlation between an original variable and a derived factor*". Hair, William, Babin and Anderson, and (2014, p.115) suggested that assessment of factor loadings ought to be at very strict levels and provided a guideline which employed the concept of statistical power to specify factor loadings considered significant for differing sample sizes. Table 4.5 covers the sample sizes required for every factor loading value to be regarded important.

Table 4.5: Guidelines for Identifying Significant Factor Loadings Based on Sample Size (adopted from Hair et al. 2014, p.115)

Factor Loading	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
Sample Size Needed for Factor Loading	350	250	200	150	120	100	85	70	60	50

Based on these guidelines, the limit for analysing the factor loadings for this case study was 0.70 given that the sample size is 68 respondents.

For this study, the oblique promax rotation was used to simplify the interpretation of factors. Once the rotation was done, the pattern matrix table was examined to find that seven factors were identified and some variables did not load or were unable to be assigned to a factor using a factor loading of ≥0.70 as stipulated by the Hair et.al (2014, p.115) guidelines. Table 4.6 below is the Pattern matrix of the oblique promax rotation showing the seven factors identified by the analysis. Variables with factor loading below 0.70 could not load on any of the seven factors and where therefore blank as shown in Table 4.6 below.

Table 4.6: Pattern matrix of showing seven factors (Source: The Author)

Variables (v)	Component						
	1	2	3	4	5	6	7
v1			.928				
v2			1.004				
v3							
v4							
v5						.813	
v6							
v7							
v8							
v9							
v10							
v11							
v13							
v13							
v14		.806					
v15							
v16		1.032					
v17		.986					
v18							
v19							
v20					.940		
v21							
v22					.827		
v23							
v24							
v25						.777	
v26	.828						
v27							
v28	.706						
v29	.701						
v30	.757						
v31							
v32	.710						
v33	.790						
v34	.817						
v35	.894						
v36	.840						
v37	.732						

v38						
v39						
v40				.819		
v41				.883		
v42						
v43				.726		
v44						
v45						

The results from the pattern matrix in Table 4.6 indicate that some variables could not load on any factor and therefore have to be eliminated in line with Hair et.al (2014, p.115) guidelines. The elimination of variables created a change in the model parameters after re-running the analysis to obtain a result were all variables were assigned to a factor.

After re-running the analysis, results indicated that the KMO was still adequate at 0.833 and the Bartlett's test for sphericity still had a significance of p=0.000. Meaning that the sample was still adequate for factor analysis (Tabachnick & Fidell, 2007, p.614) as shown in Table 4.7 below.

Table 4.7: KMO and Bartlett's test of Sphericity 2

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.833
Bartlett's Test of Sphericity	Approx. Chi-Square	575.956
	df	66
	Sig.	.000

The analysis had a Cumulative Percentage of Variance at 75.8% variance and a scree plot indicating three factors extracted as shown in Table 4.8[3] and figure 4.3 below.

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[3] Table 4.8 is a reduced table. The full table can be found in Appendix 11.

Table 4.8: Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1)2 (Source: The Author)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	6.008	50.063	50.063	5.537
2	1.810	15.083	65.145	3.615
3	1.281	10.678	75.823	3.091

Figure 4.3: Scree plot

A total of 33 variables did not load or were unable to be assigned to a factor and were eliminated (See table 4.9 below). The variables include; v3, v4, v5, v6, v7, v8, v9, v10, v11, v12, v13, v15, v18, v19, v20, v21, v22, v23, v24, v25, v27, v28, v29, v31, v32, v38, v39, v40, v41, v42, v43, v44, and v45. The pattern matrix as presented in Table 4.9 below indicates that all variables load very well on all three factors.

Table 4.9: Pattern matrix showing three factors (Source: The Author)

Pattern Matrix			
	Component		
	1	2	3
v1			.946
v2			.964
v14		.734	
v16		.988	
v17		.984	
v26	.746		
v30	.730		
v33	.855		
v34	.853		
v35	.824		
v36	.859		
v37	.867		

Step 5: Conduct Reliability test

The fifth step of data analysis for this study was the testing of the reliability of the measures. Reliability analysis is an assessment of the degree of consistency between multiple measurements of a variable. (Hair et al., 2011, p. 123). The reliability test is the ability of a measuring instrument to give accurate and consistent result; this is frequently measured with Cronbach's alpha (Lawrence, 2017, p.7). The acceptable level of reliability-coefficient-alpha is 0.70 or greater. Therefore, any alpha coefficient that is below 0.70 must be dropped from the analysis as unreliable (Hair et al., 2011, p, 123). Table 4.10 below shows that the alpha coefficients for all factors identified were all greater than 0.70

Table 4.10: Cronbach's alpha result (Source: The Author)

Factors	Cronbach's alpha
F1	0.891
F2	0.900
F3	0.919

Step 6: Interpret and Label factors

The results from the factor analysis can be interpreted by assigning labels to the three extracted factors. It is suggested that at least two variables must load on a factor before it can be given a significant interpretation (Henson & Roberts, 2006, p.408; Williams et. al, 2010, p.9). Labelling of the factors was done in line with Hart's (2008, cited by Shehu & Akintoye, 2009, p.12) recommendation that the factor names should be brief and communicate the nature of the underlying construct. This was carried out by looking for patterns of similarity between variables that load on a factor. Factors were labelled in descending order according to their arrangement on the questionnaire (see Appendix 7). Therefore, labelling stated with the least numerical number to the highest numerical.

Factor 1 consists of two variables; v1 and v2

V1- Senior management have clear vision toward quality, this guides all aspects of running our organisation.

V2- Senior executives are visibly and explicitly committed to quality.

These statements both refer to the commitment of senior management in improving quality in the organisation. This practice emphasises the role of top management in setting clear quality improvement objectives covering every aspect of the organisation and visibly working towards achieving the set objectives (Talib, Rahman & Qureshi, 2010, p.157; Shibani, Soetanto & Ganjian, 2010, p.302). This factor has been labelled Management Commitment. The focus of this factor is to evaluate the commitment of the top management in driving proper implementation of quality initiatives in the organisation.

Factor 2 consists of v14, v16 and v17

V14- There is effective deployment of goals in the organisation.

V16- Mission statements cover the whole organisation.

V17- Vision statements cover the whole organisation

These statements relate to the organisational strategy deployment. Mission and Vision statements are both important elements of strategic management (Papulova, 2014, p.12). Mission and vision statements are very important management tools that form the bases for every other organisational strategy and objectives (Babnik, Breznik, Dermol & Sirca, 2014, p. 612; Rajasekar, 2013, p. 131). Organisations with good strategic planning have a focused

vision, a change methodology to achieve the vision and a set machinery in place for deploying the strategy while a lack of strategic planning often manifests itself either as a lack of vision or as an organisation's inability to deploy the chosen vision across all organisational units (Srinidhi, 1998, p.42)

Some researchers are of the opinion that for the mission and vision to create a positive effect on the organisation's performance, the organisation's mission and vision must first of all be known and accepted by the employees (Bart, Bontis & Tagger, 2001, p. 25; Ezekwe & Egwu, 2016, p. 2; Orhan, Erdoğan & Durmaz, 2014, p. 252). Part of strategic planning is aligning the organisation's goals and objectives, such as the quality policy, with the vision and mission statements of the organisation for successful deployment because as Stanleigh (2014) explains, managers who fail to do this will find it difficult to get support over time. This factor has been labelled Strategy Deployment also known as Hoshin Kanri (Tenant & Roberts, 2001, p.262) The focus of this factor is to evaluate employees' awareness of the organisation's goals, mission and vision and perception of the deployment of these goals.

Factor 3 consists of v26, v30, v33, v34, v35, v36 and v37

V26- The organisation implements employees' suggestions.

V30- Employees are given the necessary resources to solve any quality problems that arise

V33- Employees and/or teams are recognised for achievements in quality improvement.

V34- There is a communication system inside the organisation that allows easy communication between top management and employees.

V35- There is effective inter-communication between various levels of the organisation.

V36- The organisation uses information systems to provide high quality data in order to achieve high quality customer services.

V37- There is emphasis on prevention of errors rather than their correction.

These statements all relate to the engagement of employees through the implementation of employee suggestions, effective communication within the organisation, recognition and trust of employees. Employee engagement is centred on trust, commitment and communication between all levels within an organisation (Ryan & Deci, 2000, p. 68). Organisations who have implemented quality improvement initiatives, have employees who constantly search for opportunities to eliminate the causes of errors in the functioning of the organisation, ensuring

prevention rather than correction (Al-jawazneh & Smadi 2011, p. 234). This factor has therefore been labelled Employee engagement. This factor focuses on evaluating how employees perceive the implementation of their suggestions, recognition of their in-put in the organisation and inter-communication within the organisation.

Table 4.11 below presents the interpreted and labelled factors and their factor loadings

Table 4.11: Summary and explanation of QM implementation factors in SD as seen in Table 4.9 (Source: The Author)

Factor 1- Management Commitment		Factor loading
v1	Senior management have clear vision toward quality, this guides all aspects of running our organisation.	0.946
v2	Senior executives are visibly and explicitly committed to quality.	0.964
Factor 2- Strategy Deployment		**Factor loading**
v14	There is effective deployment of goals in the organisation.	0.734
v16	Mission statements cover the whole organisation.	0.988
v17	Vision statements cover the whole organisation	0.984
Factor 3- Employee engagement		**Factor loading**
v26	The organisation implements employees' suggestions.	0.746
v30	Employees are given the necessary resources to solve any quality problems that arise	0.730
v33	Employees and/or teams are recognised for achievements in quality improvement.	0.855
v34	There is a communication system inside the organisation that allows easy communication between top management and employees.	0.853
v35	There is effective inter-communication between various levels of the organisation.	0.824
v36	The organisation uses information systems to provide high quality data in order to achieve high quality customer services.	0.859
v37	There is emphasis on prevention of errors rather than their correction.	0.867

4.1.5 Analysis of the impact of CSFs of QM within SD.

This section analyses the level of implementation of the three factors that were identified, interpreted and labelled in section 4.1.4. The respondents' views were measured by a group of

questions built on a five-point Likert scale and coded, where 1= strongly disagree, 2=disagree, 3=neither agree nor disagree, 4= agree and 5= strongly agree. The participants were requested to answer to what degree they agreed or disagreed with the specific statement. To generate an upper and lower limit for each band on the scale, Diamond and Jefferies, (2001, p.48) suggest determining an extension. Since it is a five point scale, the extension can be determined by subtracting one from five (5-1= 4). Then, to identify the length of each scale, divide four by five (4/5 = 0.80). The upper limit for each cell is then determined by adding 0.80 to the code of Strongly Agree, Agree, Neither Agree nor Disagree, Disagree and Strongly Disagree. The distribution of the mean scores for these indicators were divided into five bands: very low (1 to 1.80), low (1.81 to 2.6), medium (2.61 to 3.4), high (score of 3.41 to 4.20) and very high (score of 4.21 to 5), derived from the measurement instrument scales. Table 4.12 below shows the range of each scale:

Table 4.12: Range of scales (adapted from Diamond and Jefferies, 2001, p.48)

Likert scale codes	Level of implementation	Lower and Upper limits of the perception scale
1	Very low	1.00 to 1.80
2	Low	1.81 to 2.60
3	Medium	2.61 to 3.40
4	High	3.41 to 4.20
5	Very high	4.21 to 5.00

The mean value of all variables that fall within a QM implementation factor and the scale on Table 4.12 are utilised to determine the level of implementation of QM. For instance, when the mean score of a factor falls between 1.00 and 1.80, it means the implementation of QM is perceived to be very low or when the mean score is between 4.21 and 5.00, the level of implementation of QM is perceived to be very high.

A description category was also developed to describe what each level of implementation signifies as represented in Table 4.13

Table 4.13: Description of perception scale for level of QM implementation (source: The Author)

Lower and Upper limits of the perception scale	Level of implementation	Description
1.00 to 1.80	Very low	Little or no evidence of implementation
1.81 to 2.60	Low	Beginning or have attempted implementation.
2.61 to 3.40	Medium	Progress has been made for implementation
3.41 to 4.20	High	An established system is in place for implementation
4.21 to 5.00	Very high	Outstanding level of implementation

Table 4.14 below shows the mean scores of the CSFs as obtained from factor analysis of the questionnaire.

Table 4.14: Perceived level of implementation of CSFs factors in SD (Source: The Author)

CFSs in SD	Variables[4]	Mean score	Weighted Mean score	Perceived level of implementation
Management Commitment	v1	3.17	3.11	Medium
	v2	3.04		
Strategy Deployment	v14	3.11	3.41	High
	v16	3.57		
	v17	3.54		
Employee Engagement	v26	2.67	2.81	Medium
	v30	2.45		
	v33	3.08		
	v34	2.92		
	v35	3.13		
	v36	2.72		
	v37	2.73		
	Average Score		**3.11**	**Medium**

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[4] See variables in Table 4.11

The results from Table 4.14 indicate that the implementation of Management Commitment factor is perceived by the employees as medium. This result signifies that management commitment may not be high enough to drive the implementation of QM initiatives within SD. The result of the implementation of the second factor, strategy deployment is perceived as high. The third factor, Employee engagement, has the lowest perceived mean score compared to the other two factors. With a score of 2.81, it is perceived by employees to be the least implemented factor in the organisation. These findings are further discussed in section 4.3.2.

The overall results of the level of QM implementation in SD might indicate that overall, the organisation has made some progress in implementing CSFs of QM in some areas but the implementation is not high enough to form an established system for effective implementation of all factors necessary for QM implementation.

Having analysed the perceived impact of the QM factors across SD, this study moves on to carry out an analysis of the perceived impact of the identified QM factors by employees at the different management levels within SD because it has been suggested that when there is a change in organisations such as the implementation of quality initiatives, agents of change should consider the needs of employees at different management levels in order to achieve a successful organisational change (Jones, Watson, Hobman, Bordia, Gallois & Callan, 2008, 296). Differences in perceptions of the impact of QM factors within the organisation can have implications for QM implementation as was identified in a study by Alhaqbani, Reed, Savage & Ries, (2016, p.924)

4.1.6 Analysis of QM factors across management levels in SD.

This section assesses how employees across the different management levels in SD perceive the implementation of each QM factor identified in this study. The management levels are made up of senior management, middle management, lower management and non-management. Table 4.15 presents mean values of the variables which make up all factors as perceived by senior management in SD.

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Table 4.15: Perceived level of implementation of CSFs by senior management in SD (Source: The Author)

CSFs	Variables	Mean score	Weighted Mean score	Perceived level of implementation
Management Commitment	v1	3.20	3.10	Medium
	v2	3.40		
Strategy Deployment	v14	3.60	3.67	High
	v16	3.60		
	v17	3.80		
Employee Engagement	v26	3.20	3.28	Medium
	v30	3.20		
	v33	3.40		
	v34	3.40		
	v35	3.80		
	v36	3.60		
	v37	2.80		
	Average Score		**3.35**	**Medium**

These results indicate that on average, the senior management perceive that the implementation of the QM factors identified in this study is medium at an average score of 3.35. Implementation of Management commitment and Employee engagement were perceived to be medium while Strategy deployment was perceived to be highly implemented. These findings could indicate that senior employees are highly aware of the organisation's goals, mission and objectives and its strategic deployment within the organisation but might believe that employee engagement is not high in implementing quality improvement goals and objectives. An interesting finding is that they have rated their commitment to QM implementation as medium. These findings are further discussed in section 4.3.2.

Table 4.16 presents the results of the perceived implementation of the CSFs by middle management employees within SD.

Table 4.16: Perceived level of implementation of CSFs by middle management in SD (Source: The Author)

CSFs	Variables	Mean Score	Weighted Mean score	Perceived level of implementation
Management Commitment	v1	3.10	3.07	Medium
	v2	3.05		
Strategy Deployment	v14	2.68	3.16	Medium
	v16	3.37		
	v17	4.42		
Employee Engagement	v26	2.63	2.79	Medium
	v30	2.39		
	v33	3.10		
	v34	2.97		
	v35	3.07		
	v36	2.63		
	v37	2.71		
	Average Score		3.01	Medium

These results indicate that on average, the middle management perceive that the implementation of the CSFs identified in this study is medium at an average score of 3.01. Mean scores of the individual QM factors were all within the medium parameter as given on the scale in Table 4.12 above. These findings are further discussed in section 4.3.2.

Table 4.17 below presents the results of the perceived implementation of the CSFs by lower management employees within SD.

Table 4.17: Perceived level of implementation of CSFs by lower management (Source: The Author)

CSFs	Variables	Mean score	Weighted Mean score	Perceived level of implementation
Management Commitment	v1	2.86	2.73	Medium
	v2	2.6		
Strategy Deployment	v14	3.20	3.37	Medium
	v16	3.66		
	v17	3.26		
Employee Engagement	v26	2.40	2.42	Low
	v30	2.06		
	v33	2.66		
	v34	2.26		
	v35	2.73		
	v36	2.33		
	v37	2.53		
Average Score			**2.84**	**Medium**

These results indicate that on average, the lower management perceive that the implementation of the CSFs identified in this study is medium at an average of 2.84. Implementation of Management commitment and Strategy deployment were perceived to be medium but interestingly, Employee engagement was perceived to have a low level of implementation with a mean score of 2.42 which falls within the low parameter on the scale given in Table 4.12 above. These findings are further discussed in 4.3.2

Table 4.18 presents the results of the perceived implementation of the CSFs by non-management employees within SD.

Table 4.18: Perceived level of implementation of CSFs by non-management in SD (Source: The Author)

CSFs	Variables	Mean score	Weighted Mean score	Perceived level of implementation
Management Commitment	v1	3.90	3.80	High
	v2	3.70		
Strategy Deployment	v14	4.40	4.30	Very high
	v16	4.20		
	v17	4.30		
Employee Engagement	v26	3.00	3.28	Medium
	v30	2.90		
	v33	3.50		
	v34	3.70		
	v35	3.60		
	v36	3.20		
	v37	3.10		
Average Score			**3.79**	**High**

From Table 4.18, the results indicate that on average, the non-management perceive that the implementation of the CSFs identified in this study is high at a mean value of 3.79. Strategy deployment had a very high score at a mean score of 4.30, followed by Management commitment which had a high score of 3.80. Employee engagement had the least score at a medium score of 3.28. These findings are discussed in section 4.3.2.

The analysis of the implementation level of the CSFs identified in this study as perceived across management levels indicates that employees at senior, middle and lower management levels perceive the implementation of CSFs of QM to be at a medium level in SD with the exception of the non-management employees who perceive implementation of CSFs of QM identified in SD to be at a high level. Further analysis to determine the level of implementation of each identified factor, showed that the employees at different management levels perceive the level of their implementation differently. Across the management levels, Strategy deployment consistently had the highest score, Management commitment consistently had a medium score while Employee engagement consistently scored the lowest. This result could indicate that

employees within this organisation are aware of the organisation's goals and objectives but perceive that they have not been included in the formulation of the organisation's goals and objectives, thus the medium score for Employee engagement (Panda & Gupta, 2003, p.25). This result could also indicate that there is a gap in communication between the different levels of management within the organisation resulting in a disengagement of middle and lower managers from the strategic goals of the organisation as formulated by the senior management (Kosgie, 2014, p.16; Patro, 2013, p.2693). The medium score of management commitment could indicate that senior management have formulated and communicated the strategies for quality improvement, thus the high score for strategy deployment from senior management and non-management, but middle and lower managers perceive that senior managers are not committed to seeing that all factors are highly implemented in the organisation.

These findings are further discussed in section 4.3.2. The next section presents the external barriers hindering the implementation of QM factors in SD.

4.1.7 Results regarding external barriers hindering the implementation of QM in SD

The barriers hindering QM implementation have been differentiated into external and internal barriers where external barriers are obstacles which are not within the control of the organisation and therefore, their impact on QM implementation can only be reduced. Internal barriers are obstacles within the control of the organisation and can be eliminated. In the questionnaire, the external barriers were represented as challenges while internal barriers were represented as barriers to avoid confusion for the respondent.

The respondents' views were measured by a group of questions built on a five-point Likert scale, where 1= strongly disagree, 2=disagree, 3=neither agree nor disagree, 4= agree and 5= strongly agree. The respondents were requested to answer to what degree they agreed or disagreed with the specific statement. Table 4.19 below presents the results of the external barriers inhibiting implementation QM in SD. The results are ranked in descending order, where the challenge with the highest mean score is perceived to be the biggest external obstacle to QM implementation while the challenge with the lowest mean score is perceived to be the least external obstacle to QM implementation.

Table 4.19: External barriers to QM implementation in SD (Source: The Author)

Barriers	Mean scores	Rank
Inadequate facilities is a challenge.	4.42	1
Inadequate infrastructure is a challenge	4.33	2
Abandonment of projects due to lack of funds is a challenge.	4.26	3
Lack of availability of modern technology is a challenge	4.22	4
Delays in the completion of projects is a challenge	4.16	5
Slow process of decision making is a challenge	3.82	6
Lack of information flow from top management is a challenge.	3.71	7
Changes in projects already embarked upon is a challenge.	3.62	8
Lack of innovation and creativity within the system is a challenge	3.52	9

The results indicate that the highest mean score was 4.42 while the lowest mean score was 3.52. Inadequate facilities and inadequate infrastructure are perceived to be the two biggest external barriers preventing the implementation of QM initiatives in SD. Lack of innovation and creativity within the system was perceived to be the least external barrier to the implementation of QM initiatives in SD. The implications of these findings are discussed in section 4.3.3 with support from the qualitative data and literature.

The next section presents the results for the internal barriers hindering the implementation of QM in SD.

4.1.8   Results regarding internal barriers hindering QM implementation in SD

This section ranks the internal barriers (obstacles which are within the control of the organisation) to QM implementation as perceived by employees in SD. The respondents were asked which of the barriers was perceived to be a strongest or the weakest barrier to the implementation of QM within their organisation. The respondents' views were measured by a

group of questions built on a five-point Likert scale (1=Not a barrier, 2= Weak barrier, 3= I don't know, 4= A strong barrier, 5= A very strong barrier). Table 4.20 below presents the results of the internal barriers inhibiting QM implementation. The results are ranked in descending order, where the barrier with the highest mean score was perceived to be the strongest barrier to QM implementation while the barrier with the lowest mean score was perceived to be the lowest barrier to QM implementation in SD.

Table 4.20: Internal Barriers to QM implementation in SD (Source: The Author)

Barriers	Average scores	Rank
Lack of training programs relating to quality management.	4.28	1
Lack of top management commitment to QM implementation	4.23	2
Lack of use of quality measurement.	4.19	3
Lack of effective measurement of quality improvement	4.17	4
Lack of focus on customer satisfaction	4.09	5
Ineffective communication between the organisation and its customers	4.07	6
Poor organisational communication	3.99	7
Lack of commitment to quality strategy requirements.	3.96	8
Lack of a recognition system	3.66	9
Lack of a reward system.	3.64	10
Resistance from employees	3.50	11

Table 4.20 shows the mean score for those internal barriers which prevent the implementation of QM in SD. The highest mean was 4.28 and the lowest mean was 3.50. The table therefore illustrates that lack of training programs relating to QM, lack of top management commitment to QM implementation, and lack of quality measurement respectively were perceived to the major barriers hindering the implementation of QM in SD. Resistance from employees was perceived to be the least barrier to QM implementation. The implications of these findings for SD are discussed in section 4.3.3.

4.1.9   Summary

The results of the quantitative analysis of the questionnaire suggests that Quality control and Assurance is perceived to be the main QM approach adopted for implementation of quality management initiatives in SD. Factor analysis identified three critical success factors of quality management, namely; Management commitment, Strategic deployment and Employee engagement. Results of descriptive analysis indicated that overall, the perceived level of implementation of the identified factors was at a medium level. Further analysis indicated that there are differences in opinion across management levels concerning the level of implementation of the factors identified in this study. Senior, middle and lower management all perceived implementation to be medium while non-management employees perceived the overall implementation of the factors to be high. The results of the barriers to implementation of QM in SD indicated that the major external barrier is perceived to be inadequate facilities while the least external barrier was perceived to be lack of innovation and creativity within the system. The major internal barrier was perceived to be lack of training programs relating to QM while resistance from employees was perceived to be the least barrier to QM implementation. These findings are further discussed in combination with findings from analysis of the qualitative data in part 3 of this chapter.

The next part of this chapter presents findings from the qualitative analysis of interviews carried out with employees of SD.

4.2.1 Qualitative analysis of interviews

This section presents findings from the qualitative data collected using interviews with staff of SD. Template analysis was adopted for analysis as discussed in section 3.2.8.1 A protocol was developed and used as a guide in conducting the analysis (also discussed in section 3.2.8.1). The interviews focused on exploring the understanding of quality and quality management among staff of this organisation and to explore the perceived key enablers as well as barriers to the implementation of quality management initiatives in SD. The discussion centred on themes which included job roles, reason for QM implementation, improvement initiatives implemented, enablers of the implementation and obstacles to implementation of improvement initiatives in SD.

4.2.2 Characteristics of participants in the interviews in SD

Semi-structured interviews were conducted with five employees in SD. The interviewees included a senior management staff who is a deputy director and the head of a unit within SD,

a middle management staff who is an assistant chief, two lower management staff comprising a principle officer and a senior officer and lastly, a non-management staff who is a technical officer. The details of participants and their identifiers are presented in Table 4.21

Table 4.21: Interview participants and their identifiers in SD. (Source: The Author)

Name	Job level	Identifier
Participant 1	Senior manager	HOU
Participant 2	Middle manager	ASC
Participant 3	Lower manager	POF
Participant 4	Lower manager	SOF
Participant 5	Non-manager	TOF

4.2.3 Analysis of interview themes

Using the protocol discussed in section 3.2.8.1, the themes drawn from the interviews are described below;

4.2.3.1 Organisation type

The first theme from the responses of the interviewees was the type of organisation SD is said to be and the functions it carries out. From the responses, SD is a Nigerian government owned organisation involved in research and development in satellite technology, design of satellite subsystems and monitoring and control of Nigerian satellites. This theme was explored to meet the aim of this study which is to investigate QM implementation in Nigerian public sector organisations in the space industry. The responses from the interviewees confirm that this is a Nigerian PSO and the functions of the organisation confirm that it is in the space industry.

4.2.3.2 Job role

The second theme that arose from the interview was the job roles of the staff. According to the analysis of job roles of the participants' views in relation to implementation of quality initiatives in SD, the job role of HOU involves; setting up quality standards for units and departments in line with the organisation's aims and objectives, driving change within the organisation, evaluation of the performance of units and departments and resolving issues within the quality system of the organisation. The job role of ASC involves coordination of the activities of the unit, filling out unit performance evaluation forms, etc. The job role of POF

and SOF involves design of satellite space systems according to set standards. The job role of TOF involves maintenance of hardware and equipment in the organisation.

The job roles as explained by the participants gave the researcher an understanding of the role each employee plays in implementing QM within the organisation.

4.2.3.3 Quality concept

The third theme from the interviews was the general understanding on the concepts of quality and QM. Four of the participants associated their answers with maintaining set standards for customer satisfaction. SOF described quality as *"... the standard of a thing and stated that QM has to do with the putting people and processes in place to manage the standards set in place"*. HOU described quality as "*... adhering to specific standards. A standard meant to satisfy the customer and QM is having a plan in place to ensure adherence to such standards to meet customer needs*". POF described quality as "*... having a superior product which is marketable, and QM is all about setting down rules to guide in maintaining the quality standards of the product*". TOF described quality as "*... meeting appropriate standards to deliver certain services and QM is about operationally keep the quality standards going*"

However, ASC's response was quite different from the others. ASC defined quality as "*... doing things the right way, using the minimum amount of energy to achieve the best results. It is using the minimum amount of resources to get maximum results and we should be able to do this all the time*"

Looking at these definitions of quality from the participants, four of the participants based their answers on adhering to and meeting standards while one participant related quality to achieving best results at a minimum cost. The responses of participants give an indication as to the type of QM approach has been that adopted for quality improvement in the organisation as described. This theme is discussed in more detail in section 4.3.1 with support from results gotten from the quantitative analysis of the questionnaires.

4.2.3.4 Reasons for QM implementation

The fourth theme which was drawn from the interviews discussed the reasons for the implementation of QM in the organisation. Studies indicate that public sector organisations all over the world are implementing quality initiatives in order to reap the benefits associated with the implementation of QM (Krishnan, 2016, p. 246; Al-Ibrahim, 2014, p.134). This theme determines if the reasons for the implementation of quality initiatives are consistent with those

found in literature. This theme also provides an insight to what the employees in these organisations perceive to be the benefit of implementing quality initiatives. All of the participants were of the opinion that quality initiatives are been implemented because the government mandates them to do so. POF and SOF stated that the implementation of QM initiatives is related to the type of work carried out at the organisation, as the satellite technology industry is known to be an industry that demands high quality standards. ASC held that as a government organisation, SD cannot operate in isolation of wider government operational system and was also of the opinion that there were some modifications within the system to replace some inefficient processes.

In his words "*this is a government organisation and we cannot work in isolation from what is happening in the larger government, so we share a similar quality management system. The larger government bureaucratic procedure is what was transferred to this place with procedures set up by the head of service of the federation. However, modifications have been made to some inefficient processes*"

The responses by participants in SD indicate that the organisation is implementing QM initiatives to improve processes in the organisation and provide products that are of high quality (Talib & Rahman, 2010, p.263). These responses are also consistent with literature as discussed in section 2.7. The responses indicate that the Nigerian government is making use of QM initiatives to reform its public sector (Ibietan, 2013, p. 53; Nigerian Bureau of Public Service Reforms (BPSR), 2017; Omisore, 2013, p. 18).

4.2.3.5 Ways quality management has been implementation

This theme provides an insight to the knowledge employees have about the implementation of quality initiatives, that is, what they perceive are measures set up to implement quality management. It is important for employees to understand these actions because when employees have knowledge of the "what and why" of quality improvement practices, they are less likely to resist change (Fernandez & Rainey, 2006, p.170).

The following were identified by the participants:

- Creating a quality management unit in the organisation; HOU and TOF stated that a unit had been set up which had the responsibility of quality control in the organisation.
- Setting performance standards in units and departments; according to HOU *"each department sets quarterly targets for every unit under it"*

- Internal and external audits; this was stated by ASC

- Creating an organogram with clearly defined job roles and responsibilities for all staff in the organisation; ASC stated that "*an organogram has been created showing specific job roles and the portfolios attached to the job*"

- Quarterly performance evaluation of all units and departments; According to HOU "*units and departments set their own targets and we monitor by sending out questionnaires quarterly. We (senior management) assess performance based on the answered questionnaires*"

- Monitoring adherence to set standards for projects; POF stated that "*projects in the organisation are monitored to make sure they are up to set standards*"

These practices are consistent with quality management practices mentioned in literature. Some organisations establish a quality department as a prerequisite for QM implementation. These departments carry out checks on products and processes to ensure they are within set standards (Moheel, Alkatheri, AlSukhayri, AbdulAziz, 2019, p.54; Dewhurst, Lorente & Dale, 1999, p. 397). Crosby (1984, p.108) in his 14 steps of quality improvement acknowledges measurement of performance as an important step in the implementation process of QM. Oakland (2003, p.294) postulates that to make QM effective, there must be a review of the organisation's structure to include clearly defined job responsibilities and operational procedures.

4.2.3.6 Enablers of quality management implementation in SD

The sixth theme drawn from the interviews was the enablers of quality management implementation within the organisation. This theme provides insight to what employees perceive is working in favour of the quality improvement journey. Two factors were identified as enablers of QM implementation;

- Management commitment; HOU and TOF mentioned that the senior management were committed to the implementation of QM and had therefore, set up a quality management department and quality managers are assigned to projects to carry out checks and make sure all projects meet the required quality standards.

- Non-resistance from employees; ASC explained saying "*employees are generally willing to participate in implementing changes to bring about quality improvement of products and services delivered by the organisation*".

These findings are consistent with literature Moheel, et.al (2019, p.54)

4.2.3.7 Barriers (external obstacles) preventing QM implementation

The seventh theme from the interview was external barriers which serve as obstacles to implementing quality initiatives and are out of the control of the organisation. The barriers mentioned were

- Government influence in terms of decisions in appointing managers in public organisations. ASC explained this barrier "*some of the managers who make decisions are not engineers, so they don't really understand what has to be done*"

- Government influence in terms of funding; HOU explained "*the late passing and implementation of the national budget has had a negative effect on the implementation of quality improvement initiatives in the organisation*"

- Lack of sufficient funds for the organisation leading to scarce resources needed to carry out projects for the implementation of quality improvement initiatives.
  HOU stated that "*lack of funding is a big challenge for us, this has led to a lack of adequate equipment, most especially software to aid our work*"

From content analysis of the questionnaire, three respondents highlighted inadequate infrastructure in terms of poor power supply. One of them wrote "*poor power supply is a big challenge for us, we cannot work when there is no electricity*". This is could be due to intermittent power supply in Nigeria.

These responses are all consistent with literature. Arshida et. al (2013, p.258) identified government influence as a barrier to QM implementation in a PSO in Libya, Kosgie (2014, p.15) identified insufficient funds from government as a barrier to QM implementation in a PSO in Kenya and Sajjad & Syed (2017, p.27) also identified lack of resources as a barrier to QM implementation in a PSO in Pakistan.

4.2.3.8 Barriers (internal obstacles) to quality management implementation

The eighth theme from the interviews was internal barriers which serve as obstacles to implementing quality initiatives and can be controlled by the organisation. The barriers mentioned were;

- Lack of management commitment to ensure the implementation of quality improvement initiatives in the organisation. ASC stated that lack of communication from senior management on quality issues and SOF stated "*mismanagement of funds*

by senior management because some funds allocated for the implementation of some projects are not spent on those projects but are instead diverted to doing other things"

- Bureaucracy; ASC explains "*you have to report every step you take and inform someone who has to raise a memo to tell someone else, who then asks why that step has to be taken. The person you told comes back to you to explain why you want to take the step. He then goes back to explain to the other person who then asks what the financial implications of taking the step are. It just goes back and forth so that makes work very challenging and difficult"*

  ASC also stated that bureaucracy was encouraging "favouritism" in the organisation. According to him "*There is favouritism in allocating individuals to projects and trainings, instead of allocating competent staff to project teams, senior management select staff which they favoured in such projects".*

- Giving staff responsibility without authority; ASC also explains "*we are given a lot of responsibility without commensurate authority which is a problem for us because one of the requirements of ISO 9000 is that when you are giving people responsibility, you also give them authority".*

- Goals and objectives are not clearly defined; according to ASC "*If for example, I set a target of doing a, b c and d and for the first quarter I have done only d but have not done a, b or c and when I am asked how much I have achieved? And my answer is 25%. Did I define earlier that a is a prerequisite to b, b is a prerequisite to c and c is a prerequisite to d or are they independent? Why d? If I achieved d what is affecting a, b and c? These types of things are not clearly defined. It is now on your prerogative to award the degree of achievement".*

- No feedback system in place; ASC mentioned "*I have been doing this* (performance evaluation surveys) *for the past 3 years and I have never gotten any feedback. No feedback, its basically just answering questions and sending it back"*

- Not focusing on all the objectives of the organisation, concentrating too much on few objectives and abandoning other objectives. ASC explains this barrier "*senior management are not focusing on all the objectives of the organisation. Some processes are receiving attention and experiencing improvements, while other areas are lagging behind".*

- Employee resistance to change; HOU stated that "*we have been having issues from the staff concerning their performance. They are not willing to comply when we send out surveys for performance assessments*".
- Lack of training and development in quality related issues; POF stated that "*there is a lack of training for employees to handle quality related issues*"

All the barriers mentioned are consistent with barriers to QM identified in literature. Suleman (2015, p.127) identified lack of management commitment, Kosgie (2014, p.15), Sajjad & Syed (2017, p.28) identified lack of training as a barrier to QM implementation and Shibani, Saidani & Gherbal (2012, p.89) also identified employee resistance as a barrier to QM implementation.

4.2.3.9 Benefits of implementation of QM

The ninth theme drawn from the interview was the perceived benefits from implementing quality management. Having the knowledge that an organisation is benefitting from the implementation of QM can be a source of motivation for the management and employees (Mosadeghrad, 2014, p.167). This theme provides an insight to what employees in SD perceive to be the benefits their organisations have gained from the implementation of quality initiatives.

Three of the participants could not directly identify benefits to the organisation from implementing QM initiatives in SD. ASC however, identified that there was an improvement in the development process within the organisation. The process for the development of researchers within the organisation had been improved and was perceived by the respondent to be more efficient. ASC explained that "*formerly, employees would go on study leave, workshops, trainings and conferences which were for their personal benefit but at the expense of the organisation. The new process in place was that the organisation identified areas of expertise which were lacking within the organisation and would send employees for such trainings which would add value to the organisation*".

HOU also stated that "*the creation of an organogram for employees, units and departments has helped to eliminate duplication of responsibilities, it also saved a lot of wasted time as management are able to quickly identify who to allocate responsibilities to, employees can also quickly identify who to meet to obtain permission or sign off a document and who to collaborate with when carrying out projects*".

These benefits of implementing QM are all consistent with those found in literature (Ab Rahman et.al, 2011, p.620; Polat et.al, 2011, p.1118)

4.2.3.10 Suggested improvement possibilities by employees

The tenth theme drawn from the interview was suggestions from the participants on possible improvements that can be done in SD. Employee suggestions usually contain information that could improve an organisation's processes (Arthur, Aiman-smith & Arthur, 2010, p.738). Organisations wishing to become more innovative are advised to create a mechanism that encourages employees to contribute useful ideas for improving their organisations (Buech, Michel & Sonntag, 2010, p.519; Milner, Kinnell & Usherwood, 1995, p.4).

The suggestions mentioned were

- Setting of targets for individual, units and departments with clearly defined output which can be measured.
- Senior management should have a clear vision of what they want to achieve within their tenure in office. This vision should encompass all the objectives of the organisation and communicated to every member of the organisation.
- Training of staff in quality related issues.

4.2.4 Interview Analysis Summary

The interviews with the employees of SD discussed the job role of the employees, their understanding of the quality concept and the reason for the implementation of quality improvement initiatives within SD. The interviewees also described the key enablers and benefits of improvement efforts, barriers to improvement efforts and suggested improvement possibilities that can be done in SD.

The analysis of the interviews pointed to the understanding of the quality concept in SD (section 4.2.3.3). The concept of quality and QM described by most of the interviewees was in line with the definition of quality control which has to do with ensuring that quality of a product meets the required standards (Ambrus & Suszter, 2013, p.136; Crosby (1979, p.15). The analysis also showed senior management's commitment to implementing quality improvement objectives (section 4.2.3.3). More so, the participants described several issues that hinder the implementation of quality initiatives in the organisation which include lack of commitment by senior management to QM implementation, the influence of government funding on improvement efforts in the organisation, poor communication between senior management and employees, bureaucracy, favouritism and a lack of training in the quality management concept

(section 4.2.3.7 and 4.2.3.8). Furthermore, in terms of determining the enablers of QM implementation, the participants identified the following; management commitment and lack of employee resistance to change in the organisation. The interviews revealed that the implementation of QM initiatives in the organisation was to improve the organisation's processes in order to deliver quality products and services to the customers. The type of industry and work carried out by the SD has also contributed to the reason for having quality systems in place (section 4.2.3.4).

The interviews also revealed that the implementation of quality initiatives in SD was hindered by barriers which are caused by both external and internal forces in the organisation. As SD is a government owned organisation, most of its organisational structure is in line with the bureaucratic government structure in Nigerian public sector organisations. This was said to be having a negative influence on the implementation of quality measures in the organisation, most especially in the area of funding for the organisation. Furthermore, the interviewees offered suggestions for ways in which quality management can be implemented in SD (section 4.2.3.10). The suggestions included training of staff in quality related issues, this was suggested because according to the POF, "*we lack trained personnel to handle quality related issues*". Setting of clearly defined targets and objectives was another suggestion given for the proper implementation of QM in SD.

The key enablers or success factors for QM implementation from the thematic analysis of the interviews are consistent with the success factors found in the analysis of the questionnaires and those found in literature (Bajaj, Garg, Sethi 2018, p.130; Neyestani & Juanzon, 2016, p.1585; Adeoti, 2011, p.20). The barriers identified from thematic analysis of the interviews are also consistent with those found in literature such as Ceno, Vira & Kourouklis (2017, p.5), Kundu & Manohar (2012, p.663) and Azyan, Pulakanam & Pons (2017, p.482).

The next section discusses the findings from the questionnaires and interviews

Part 4.3: Discussion of quantitative and qualitative analysis

This section discusses the results that emerged from both the both quantitative and qualitative analysis of the questionnaires and interviews. In this section, the research findings are linked to the relevant literature in order to achieve the research objectives.

4.3.1 First objective: to determine the definition of Quality and identify QM technique implemented by SD for quality improvement.

The results of the analysis of the quantitative data in section 4.1.4 showed that the most recognised QM technique was perceived to be applied for quality improvement is Quality control/assurance. Out of all the QM approaches listed in the questionnaire, Quality control/assurance was the highest selected technique by employees of SD. This was also noted by the interviewees when asked to describe their understanding of quality and QM. There is usually not much conformity in terms of the general view of QM as QM implies different meaning to different people (Dale, 2003, p.3) but most of the description from the interviews aligned closely with the concept of quality control as defined by Montgomery, (2009, p17).

Ferreira and Diniz (2006, p.2) postulates that the concept of QM revolves around the interaction between three variables; product, client and use. The dynamics of the interaction between these variables reflects in an organisation's working policies. From analysis of the interviews, the definition of concept of quality and QM seems to resonate a focus on product quality and use. Therefore, the definitions by participants were in line with meeting product standards and adhering to required quality requirements. A possible reason why adhering to standards is perceived by most of the employees to be the meaning of the quality concept could be due to the intention of the organisation to obtain an ISO 9001:2015 certification as was mentioned by HOU "*we would love to obtain an ISO 9001: 2015 certification, it is our ambition to be a certified organisation*". Therefore, it might be that a quality management system is being put in place which adheres to ISO standards.

Applying a QM approach for quality improvement in an organisation is excellent but it can prompt conflicting approaches inside the organisation. However, having a quality management system in place, guarantees that everybody is working through similar procedures and towards similar goals since it is commonly applied over the whole organisation (British Assessment Bureau, 2019). From analysis, it could be Quality control/assurance has been adopted as the main QM approach but other approaches such as lean management have also been adopted to form a quality management system. Quality control/assurance could have been adopted as the main technique due to the functions of the organisation which is the manufacture of satellite and satellite space systems.

These findings are consistent with other studies, Patro (2013, p.2694) postulates that some organisations consider ISO 9000 certification as the first step in the implementation process of

QM. He also recognises the important role of quality control as a strategic technique in achieving quality management in an organisation.

4.3.2 Second objective: to determine the QM factors for quality improvement in SD and the perceived level of implementation of the QM factors by employees.

The analysis of questionnaires and interviews identified three CSFs for QM implementation in SD; Management Commitment, Strategy Deployment and Employee engagement. All three identified factors are consistent with literature as discussed below;

i. Management commitment- The results from the questionnaire revealed that commitment to QM implementation by senior management was perceived to be medium in SD as shown by a total mean score of 3.04, determined on the five-point Likert scale. Further analysis of the responses by employees at different management levels showed that senior, middle and lower management employees supported this finding. However, descriptive analysis of responses from non- management employees indicated that they perceived the implementation of management commitment to be high. All employees interviewed mentioned the important role management commitment had to play with regards to implementing QM in SD. Just as the quantitative data indicated a difference in the opinion of the level of implementation of management commitment, the interviews also indicated that there is a difference in opinion on the level of implementation of this factor.

This finding is consistent with results of other studies on the factors of QM implementation in the public sector. Studies by Santos, Santana and Elhimas (2018, p.9) and Sadikoglu and Olcay (2013, p.8) found that management commitment and support was needed for the implementation of quality initiatives in public sector organisations.

ii. Strategy Deployment- the analysis of the questionnaire showed that the employees of SD are aware of the goals, mission and vision statements of the organisation. Overall, the level of implementation of this factor was perceived to be high by employees of SD. Individually, senior and non-management employees perceived that the implementation of this factor is high, giving an indication that the organisation's performance in the implementation of this QM factor is outstanding. However, middle and lower level managers perceive that the implementation of this factor is at a medium level which might be an indication that there has been progress in the implementation level of this factor in certain areas in the organisation, but this progress has not been in all areas. ASC

suggested this when he mentioned "*senior management are not focusing on all the objectives of the organisation. Some processes are receiving attention and experiencing improvements, while other areas are lagging behind*".

Another reason why middle and lower management perceive the level of implementation of this factor as medium could be the absence of authority from senior management to implement organisational plans and objectives. The possibility that employees are very much aware of the organisation's objectives can be an indication of good strategic planning by the senior management and effectively communicating these plans to the rest of the employees in the organisation. However, there might exist an absence in delegation of authority by senior management due maybe to fear of loss of status (Demings, 1986, p.10). ASC confirmed this when he mentioned this as a barrier "*we are given a lot of responsibility without commensurate authority which is a problem for us because one of the requirements of ISO 9000 is that when you are giving people responsibility, you also give them authority*".

For successful strategy deployment, senior managers need to trust their staff and allow them take decisions and be willing to see them make mistakes (Kosgie, 2014, p.14). Senior managers should take advantage of this knowledge of the strategic plans by employees and integrate them with quality improvement initiatives for easy deployment and implementation.

iii. Employee engagement- This factor scored the lowest from the perceived level of implementation. This was also reflected in the responses from the interviews. Analysis of the interviews revealed that there is lack of feedback from top management which could cause a lack of inter-communication in the organisation, leading to a lack of confidence in the system. Another cause can be bureaucracy as mentioned by one of the respondents. Bureaucracy is characterised by a rigid structure with a top - down communication system which normally leads to a lack of engagement of the staff within any organisation. The study done by To, Lee and Yu (2011, p.70) showed that the involvement of people in the process of QM implementation is very important. Markos and Sridevi (2010, p.89) postulate that any initiative of improvement taken by management cannot be successful without wilful involvement and engagement of employees. This point was raised by the interviewee in section 4.2.3.8 who mentioned that continuous training of all staff in quality related issues was not carried out in the organisation resulting in a disengagement of staff from improvement initiatives. In

organisations seeking to improve the quality of their processes, products and services, training is necessary to allow some discretion allowing employees to do their job without excessive control by managers and be allowed to solve minor issues without having to ask for authorisation from people above in hierarchy (Vinni, 2007, p.116).

4.3.3 Third objective: determine the barriers to QM implementation in SD.

The barriers, both external and internal are all consistent with those in literature. Analysis of the questionnaire showed that inadequate facilities, inadequate infrastructure and abandonment of projects already embarked on, were the major external barriers facing the implementation of quality improvement in the organisation. Analysis of the interviews revealed that the lack of facilities and infrastructure was as a result of inadequate funding from the government budget. Yearly budgetary allocation was not enough to provide the necessary resources needed to implement all quality management initiatives resulting in the abandonment of some projects. A study by Emeje, Ekere, Olayemi, Isimi and Gamaniel (2019, p.1) recognises the difficulty of implementing QM in an organisation in Nigeria with limited resources. A survey of healthcare facilities in Nigeria also noted financial constraint as a major impediment to quality management implementation (Society for Quality in Healthcare in Nigeria (SQHN), 2014, p.3).

Analysis of the questionnaire also showed that lack of training programs relating to the quality management and lack of top management commitment were the major internal barriers to QM implementation in SD. This point was reiterated in the interviews by the lower managers (section 4.2.3.8) who stated that training was not an on-going process for the staff causing a lack of technical knowledge of quality management. This result is consistent with the study by Kosgei (2014, p.16) of the challenges facing the implementation of QM in a PSO in Kenya. This study found that a lack of commitment by the management and some staff members and insufficient training of key team players where some of the challenges to QM implementation.

Summary

This chapter presented the analysis and findings of the data collected through questionnaires and interviews in SD. Through factor analysis, three factors were identified for QM implementation in SD as Management Commitment, Strategy Deployment and Employee engagement. Findings also indicated that overall the level of QM implementation was perceived to be at a medium level. The major barriers to QM implementation were identified as inadequate facilities, inadequate infrastructure and abandonment of projects already embarked on due to lack of funds, lack of

training programs relating to the quality management and lack of top management commitment to QM implementation.

Findings from the interviews also support the questionnaire results as lack of funds was identified as a major factor preventing or limiting the implementation of QM. Inadequate facilities, inadequate infrastructure and abandonment of projects already embarked on were all linked to lack of funding from the government. The interviews also reflected the perceived level of implementation of QM which indicated that overall progress is being made for the implementation of QM in this organisation. The interviewees in section 4.2.3.5 showed that they were aware of the organisation's strategic policies but expressed frustration with the implementation of these policies due to a lack of commitment from the senior management. The interviewees in section 4.2.3.10 also suggested areas of possible improvement which included continuous training of staff, better strategic planning from senior management and setting of targets at all organisational levels with clearly defined expected outputs.

The next chapter analyses the data collected from the second case organisation in this study of QM implementation in Nigerian public sector organisations.

CHAPTER 5
DATA ANALYSIS AND DISCUSSION: NR ORGANISATION

5.0 Introduction

This chapter analyses and discusses the quantitative and qualitative data obtained from questionnaires and semi-structured interviews in the second case organisation named NR for the purpose of this study.

This chapter has also been divided into three parts; Part 1 presents the quantitative analysis of data collected using questionnaires in this organisation. Part 2 presents the qualitative analysis of data collected using interviews and part 3 is the discussion of the findings of the quantitative and qualitative analysis of the questionnaires and interviews.

5.1. Questionnaire analysis

The analysis begins with the organisational context and the respondents' demographic information. The second section presents a descriptive analysis of what is perceived by respondents to be the quality improvement technique(s) implemented within the organisation. The third section presents the results of the factor analysis, content validity and reliability tests for the variables used in this study to identify the key factors of Quality Management (QM) in the organisation. The fourth section is an analysis of the level of implementation of the identified QM factors within NR and the differences in perception of the level of implementation of these factors across the different management levels within NR. The fifth section describes the external barriers hindering the implementation of QM in NR organization and the last section describes the internal barriers to QM implementation within this organisation.

5.1.1 Organisational Context

NR is a public organisation charged with provision of satellite services to the Nigerian public. NR has 348 employees who work on the development and improvement of services provided to the public. The organisational structure of NR is a traditional bureaucratic structure, with vertical management layers that include the senior management, middle management, lower management and non-management staff (Haque, Pathrannarakul & Phinaitrup, 2012, p.137; Cordellaa & Iannacci, 2010, p.54). (Source: Head of customer service unit, NR).

5.1.2 Characteristics of the sample

To break down the questionnaire data, descriptive statistics pertaining to the respondents' profiles, were utilised. These concerned different demographic factors such as gender, age, educational level, position in the organisation and years of experience within the organisation as shown in Table 5.1

1. Gender - Table 5.1 shows that 82% of 56 respondents are male and 18% are female in this study.

2. Age of respondents- Table 5.1 also indicates that 54% of respondents are aged between 21 and 30, 32% were aged between 31 and 40, 14% were aged between 41 and 50, while 0% was aged between 51 and 60. This information indicates that most of the employees in this organisation are aged between 21 and 40 years old (86%).

3. Level of Education- As shown in Table 5.1, 9% have a diploma, 34% have a bachelor's degree, 48% have a master's degree and 9% have a doctoral degree.

4. Current Position- Regarding to the spread of respondents by management level, Table 5.1 shows that 14% of the respondents were senior managers, 34% were middle managers, 41% were lower managers and 11% were non-management staff. This indicates that all levels of management within this organisation are represented in this study.

5. Years of Experience- Table 5.1[5] shows that 20% of the respondents have < 5 years' experience, 62% have 5 to 10 years' experience, 16% have 11 to 15 years' experience and 2% have 16 to 20 years' experience within the industry. This result indicates that the respondents in this sample have adequate experience within the organisation to be able to provide information on QM implementation, as most (80%) of the staff have worked in NR for over 5 years.

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[5] Exhaustive enquires to collect comparative data for the whole of NR have not been successful

Table 5.1: Demographic information of respondents from NR (author's compilation)

1. Gender	Frequency	Percentage
Male	46	82
Female	10	18
Total	56	100%
2. Age		
21-30	30	54
31-40	18	32
41-50	8	14
≥ 51	0	0
Total	56	100%
3. **Educational level**		
Diploma	5	9
Bachelor's degree	19	34
Master's degree	27	48
Doctoral degree	5	9
Total	56	100%
4. **Position of respondents**		
Senior management	8	14
Middle management	19	34
Lower management	23	41
Non-management	6	11
Total	56	100%
5. Years of experience		
< 5 years	11	20
5- 10	34	62
11-15	9	16
16-20	1	2
Total	56	100%

Observations from the demographic information;

- The results showed that 86% of the respondents in this organisation were aged between 21 and 40 years at the time the data was collected.

- 9% of the respondents have a doctoral degree while 48% of the respondents have a master's degree.

- Majority of the study population, (75%), are middle managers (34%) or lower managers (41%).

- 80% of the respondents have over 5 years' experience within this case organisation.

These statistics indicate that the study population are well educated and probably had little or no challenge in completing the questionnaires. It also indicates the possibility that the perceptions of the middle managers and lower managers might have a greater impact on the overall results for NR organisation than other groups.

5.1.3 Results regarding Quality Management techniques in NR for quality improvement.

This section presents the results of the QM technique/techniques perceived to be implemented for quality improvement in SD. Respondents were asked to identify a technique or techniques that are being implemented, where more than one technique could be identified by a respondent. The technique with the most points was judged by the researcher, to be the most recognised QM technique perceived by employees to be implemented by the organisation. Respondents were also provided with the opportunity to add other QM techniques that had not been already stated in the questionnaire. The results are presented in Table 5.2 below;

Table 5.2: Quality Management techniques implemented for quality improvement in SD as perceived by respondents (source: The Author)

Quality Management Techniques	Sum	Percentage
I do not know	24	37%
Quality control/Quality assurance	22	34%
Lean management	8	12%
Just-In-Time	6	9%
TQM	5	7%
Lean Six Sigma	1	1%
5S	0	0
Quality circles	0	0
Six Sigma	0	0

In total, 66 responses were obtained. A large percentage of responses (37%) indicated that they do not know the QM technique implemented in NR. 34% indicated that Quality control/Quality Assurance is a technique implemented in NR. 12% of responses indicated that Lean management is implemented, 9% indicated that Just-In-Time is implemented, 7% indicated that TQM while 1% indicated Lean six-sigma. Six-sigma had no response.

Although Quality control/Quality assurance ranked number one, as the most recognised QM technique perceived to be implemented for quality improvement in NR, a larger percentage of the respondents indicated that they do not know the QM technique implemented in NR. This result could be an indication that NR might not have a clearly defined QM approach or set of approaches geared towards delivering quality products and services. It could also indicate a lack of training of employees in quality management concepts. This result is further discussed in section 5.3.2.

5.1.4 Factor Analysis

Factor analysis was also used to establish the QM factors in NR following the six step protocol discussed in section 4.1.4. This protocol has already been discussed in detail in section 4.1.4, therefore, only the results of the factor analysis using the steps outlined in the protocol are presented here.

Step 1: Determine data suitability for data analysis

i. Sample size - The sample size was 58 with 45 variables.

ii. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy/Bartlett's Test of Sphericity-The result of the KMO was greater than 0.5 at 0.538 and Bartlett's test of sphericity had a significance of (p = 0.000). Meaning that the data was fit for factor analysis and there was a significant correlation among variables as shown in Table 5.3 below.

Table 5.3: KMO/Bartlett's test of sphericity 1 (Source: The Author)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.538
Bartlett's Test of Sphericity	Approx. Chi-Square	3069.063
	df	990
	Sig.	.000

Step 2: Factor extraction

As explained in section 4.1.4, PCA was the method used for factor extraction in this study.

Step 3: Determining criteria for retaining factors

The cumulative percent of variance extracted, the Kaiser's criteria (eigenvalue > 1 rule) and the Scree test were the criteria used for retaining factors.

i. Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) - Table 5.4[6] below indicates a cumulative percentage of variance of 81%, highlighted on the table (meaning that there are more than enough factors to meet the specified percentage of variance explained) and a total of nine factors having an eigenvalue > 1.

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[6] Table 5.4 is a reduced table to show eigenvalues >1. The full table can be found in Appendix 11.

Table 5.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) 1 (Source: The Author)

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	16.677	37.059	37.059	9.740
2	5.533	12.295	49.354	9.690
3	3.173	7.052	56.406	9.936
4	2.837	6.305	62.711	7.699
5	2.541	5.647	68.357	6.175
6	1.818	4.040	72.398	5.504
7	1.765	3.923	76.321	5.520
8	1.389	3.086	79.407	3.338
9	1.016	2.258	81.665	5.261

This result indicates that nine factors can be retained from the analysis.

ii. Scree test
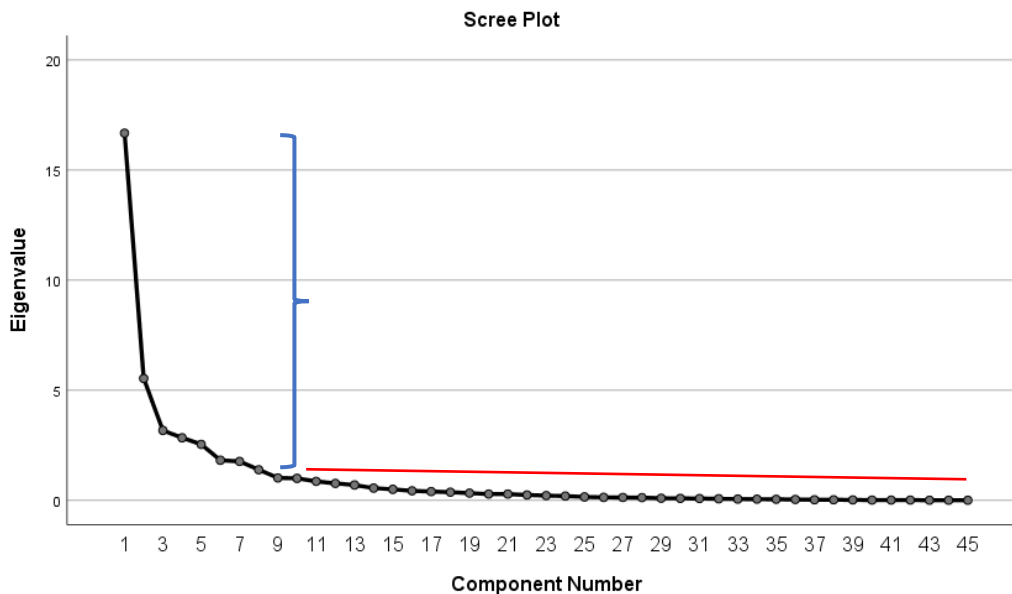
Figure 5.1: Scree plot 1 (Source: The Author)

According to the Cumulative Percentage of Variance, Kaiser's rule (Eigenvalue > 1) and Scree plot for the data set used for this study, nine factors could be retained for interpretation. The result was rotated to produce an interpretable and simplified solution.

Step 4: Selection of Rotational Method

The oblique promax rotation was used to simplify the interpretation of factors. Based on the guidelines of Hair et al. (2014, p.115), the limit for factor loading analysis was 0.75 given that the sample size is 56. The pattern matrix table was examined to find that nine factors were identified but some variables did not load or were unable to be assigned to a factor using a factor loading of ≥0.75 as stipulated by Hair et.al (2014, p.115) guidelines. Table 5.5 below is the Pattern matrix the oblique promax rotation showing the nine factors identified by the analysis.

Table 5.5 Pattern matrix of showing nine factors (Source: The Author)

Variables	Factor								
	1	2	3	4	5	6	7	8	9
v1									
v2									
v3									
v4									
v5								.878	
v6									
v7		.932							
v8		.844							
v9		.871							
v10									
v11									
v12									
v13									
v14									
v15							.910		
v16						.829			
v17									
v18									
v19	.756								

v20									
v21	.901								
v22									
v23									
v24									
v25					.801				
v26									
v27									
v28									
v29									
v30									
v31	.769								
v32									
v33									
v34			.859						
v35									
v36									
v37									
v38			.751						
v39			.871						
v40				.813					
v41									
v42									
v43				.816					
v44									
v45									

The results from the pattern matrix in Table 5.6 indicate that some variables could not load on any factor and therefore have to be eliminated (Hair et.al, 2014, p.115) The elimination of

variables created a change in the model parameters after re-running the analysis to obtain a result were all variables were assigned to a factor.

The KMO was still adequate at 0.634 and the Bartlett's test for sphericity still had a significance of p=0.000. Meaning that the sample was still adequate for factor analysis as shown in Table 5.6 below;

Table 5.6: KMO and Bartlett's test of Sphericity 2 (Source: The Author)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.634
Bartlett's Test of Sphericity	Approx. Chi-Square	186.971
	df	21
	Sig.	.000

The results from the Cumulative Percentage of Variance at 83% variance and a scree plot indicated a cumulative percentage of variance at 83% (highlighted on Table 5.7) and three factors extracted as shown in Table 5.7[7] and figure 2 below.

Table 5.7 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) 2 (Source: The Author)

Total Variance Explained				
Components	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	3.113	44.475	44.475	2.772
2	1.675	23.927	68.401	2.072
3	1.091	15.592	83.993	1.950

---

[7] Table 5.7 is a reduced table. The full table can be found in Appendix 11.
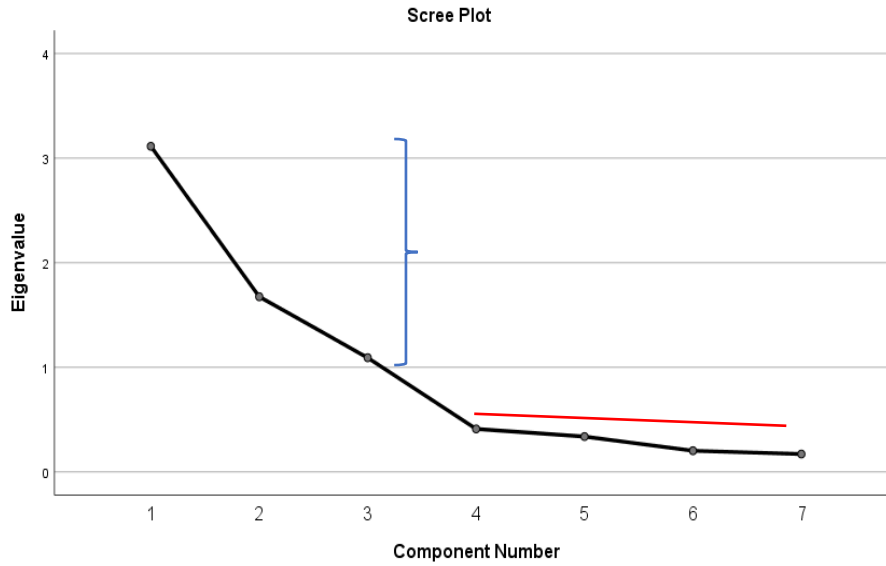
Figure 2: Scree plot 2

At the end of the analysis, a total of 38 variables did not load or were unable to be assigned to a factor and were eliminated (See table 4.9 below). The following variables that did not load or were unable to be assigned to a factor were eliminated; v1, v2, v3, v4, v5, v6, v9, v10, v11, v12, v13, v14, v15, v16, v17, v18, v19, v20, v22, v23, v24, v25, v26, v27, v28, v29, v30, v32, v33, v35, v36, v37, v40, v41, v42, v43, v44, and v45.

The pattern matrix as presented in Table 5.8 below indicates that all variables load well on all three factors.

Table 5.8 Pattern matrix showing three factors (Source: The Author)

Pattern Matrix			
	Components		
	1	2	3
v7		.982	
v8		.891	
v21			.915
v31			.905
v34	.903		
v38	.818		
v39	.927		

Step 5: Reliability test

The acceptable level of reliability-coefficient-alpha is 0.70 or greater. Therefore, any alpha coefficient that is below 0.70 must be dropped from the analysis as unreliable (Hair et al., 2011, p, 123).

Table 5.9: Cronbach's alpha result (Source: The Author)

Factors	Cronbach's alpha
F1	0.863
F2	0.805
F3	0.864

As shown in Table 5.9, the alpha coefficients for all QM implementation factors identified were all greater than 0.70 indicating that the survey is reliable and the data collected can be used for further analysis (Lawrence, 2017, p.7)

Step 6: Interpretation and Labelling

Interpretation and assigning of labels to the three extracted factors was done in line with Hart's (2008, cited by Shehu & Akintoye, 2009, p.12) recommendation which suggests that the factor names should be brief and communicate the nature of the underlying construct. This was carried out by looking for patterns of similarity between variables that load on a factor. Factors were labelled in descending order according to their arrangement on the questionnaire (see Appendix 7). Therefore, labelling stated with the least numerical number to the highest numerical number.

Factor 1 consists of two variables; v7 and v8;

V7- In my organisation, there is comprehensive identification of customer needs.
V8- In my organisation, there is alignment of process to satisfy customer needs.

These statements pertain to the identification and satisfaction of customer needs. This factor has been labelled Customer focus because both statements in v7 and v8 align closely with the concept of customer focus as defined by Sharabi (2015, p.114), "*customer focus means meeting the needs and expectations of current and potential customers by developing a comprehensive understanding of customer needs and then delivering perceived value to customers*." The focus

of this factor is to evaluate the commitment NR has shown in identifying customer needs and aligning processes in the organisation to satisfy those customer needs.

Factor 2 consists of v21 and v31

V21- Seminars and workshops in quality issues are arranged for employees as part of an ongoing process.

V31- There is recognition for outstanding performance in the organisation.

This factor has been labelled Employee focus because these statements pertain to the education and development of employees on quality issues on a continuous process and the recognition of employees with outstanding performance. According to Ya, Noor and Nasirun (2016, p. 237), providing employees with the opportunity to learn and develop has a strong effect on the employees' ability to provide satisfactory services to customers. The focus of this factor is to evaluate training and development of employees in quality issues and recognition of employees with outstanding performance in quality improvement.

Factor 3 consists of v34, v38, v39

V34- There is a communication system inside the organisation that allows easy communication between senior management and other employees.

V38- Self– assessment tools are used to improve performance gaps in the implementation and effectiveness of system, process and practice.

V39- Benchmarking is used to identify the best procedures for improvement from other organisations with similar interests and goals.

These statements pertain to the communication system in the organisation, self-assessment and benchmarking for performance improvement. Self-assessment and benchmarking are tools necessary for evaluating performance in organisation (Voss, Chiesa & Coughlan, 1994, p.83). Also, having an effective communication system in an organisation is key effective performance evaluation (Choudhary & Rathore, 2013, p.2084). Organisations use self-assessment and benchmarking to measure and compare their current performance and strategize for future process improvement activities (Jørgensen, Gertsen & Boer, 2004, p.344; Choudhary & Rathore, 2013, p.2084). For effective performance measurement and improvement, an effective communication system must be in place (Cheng, 2006, p.765). Organisational communication is used to construct a community within an organisation, to

inform and educate employees at all levels and to motivate them to support new strategies for performance improvement (Husain, 2013, p.44). This factor has been labelled Performance measurement. The focus of this factor is to evaluate the effectiveness of communication for process, product and service improvement using self-assessment and benchmarking. Table 5.10 below presents the interpreted and labelled factors, variables that make up the factors and their factor loadings.

Table 5.10: Summary and explanation of QM implementation factors on NR seen in Table 5.8 (Source: The Author)

Factor 1- Customer focus		Factor loadings
v7	In my organisation, there is comprehensive identification of customer needs.	0.982
v8	In my organisation, there is alignment of process to satisfy customer needs.	0.891
Factor 2- Employee Focus		**Factor loadings**
v21	Seminars and workshops in quality issues are arranged for employees as part of an ongoing process.	0.915
v31	There is recognition for outstanding performance in the organisation.	0.905
Factor 3- Performance measurement		**Factor loadings**
v34	There is a communication system inside the organisation that allows easy communication between senior management and other employees.	0.903
v38	Self– assessment tools are used to improve performance gaps in the implementation and effectiveness of system, process and practice.	0.818
v39	Benchmarking is used to identify the best procedures for improvement from other organisations with similar interests and goals.	0.927

5.1.5 Analysis of the perceived level of implementation of QM factors within NR.

This section analysis the three factors that were identified, interpreted and labelled in section 5.1.4. The respondents' views were assessed by questions built on a five-point. The range for each measurement scale was determined as explained in section 4.1.5. Table 5.11 below shows the range of each scale:

Table 5.11: Range of scales (adapted from Diamond and Jefferies, 2001, p.48)

Likert scale codes	Level of implementation	Lower and Upper limits of the perception scale
1	Very low	1.00 to 1.80
2	Low	1.81 to 2.60
3	Medium	2.61 to 3.40
4	High	3.41 to 4.20
5	Very high	4.21 to 5.00

The mean value of all variables that fall within a QM factor and the scale on Table 5.11 are used to determine the level of implementation of QM. When the mean score of a factor falls between 1 and 1.80, it means the implementation of QM is perceived to be very low. When the mean score is between 1.81 and 2.60, the level of implementation of QM is perceived to be low and so on. The description for each perceived level of implementation has been discussed in section 4.1.5

Table 5.12 presents description of perception scale for level of QM implementation in this study.

Table 5.12 Description of perception scale for level of QM implementation (Source: The Author)

Lower and Upper limits of the perception scale	Level of implementation	Description
1 to 1.80	Very low	Little or no evidence of implementation
1.81 to 2.60	Low	Beginning or have attempted implementation.
2.61 to 3.40	Medium	Progress has been made for implementation
3.41 to 4.20	High	An established system is in place for implementation
4.21 to 5	Very high	Outstanding level of implementation

Table 5.13 below shows the mean scores of the CSFs as obtained from the factor analysis and their perceived level of implementation in NR.

Table 5.13: Perceived level of implementation of QM factors in NR (Source: The Author)

CSFs in NR	Variables[8]	Mean scores	Weighted Mean Score	Perceived level of implementation
Customer Focus	v7	3.25	3.42	Medium
	v8	3.60		
Employee Focus	v21	2.46	2.58	Low
	v31	2.71		
Performance measurement	v34	3.71	3.46	High
	v38	3.32		
	v39	3.35		
Average score			**3.15**	**Medium**

The results from Table 5.13 indicate that overall, the perceived level of QM implementation in NR is medium at a score of 3.15. Perception level of implementation of Customer focus factor by all employees is medium at a score of 3.42. This result could be an indication that the employees perceive that the organisation might not be doing enough to drive the implementation of QM initiatives within NR in order to meet customer needs. The result of the

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[8] See variables in Table 5.10

implementation of the second factor, Employee focus has the lowest perceived score of 2.58, which could signify that employees in NR perceive that they are not engaged by senior management in the implementation of quality initiatives within the organisation. The third factor, Performance evaluation, is perceived by employees to be the most implemented factor in NR, having a high mean score of 3.46. These findings are further discussed in section 5.3.2. Having analysed the perceived impact of the implementation factors across NR, the next section analyses the perceived impact of the identified QM factors by employees at the different management levels. Further analysis has been carried out to see if the perception of the QM factors is the same across management levels or if there is a variation in the perception. The results can help the organisation identify areas of improvement as was suggested by Holden, Eriksson, Andreasson, Williamsson, and Dellve (2014, p.191)

5.1.6. Analysis of critical success factors across management levels in NR.

This section assesses the perception of the QM factors identified in this study across the different management levels in NR. Table 5.14 presents mean scores of the variables which make up all factors as perceived by senior management employees.

Table 5.14: Perceived level of implementation of critical success factors by senior management in NR (Source: The Author)

CSFs	Variables	Mean scores	Weighted Mean Score	Perceived level of implementation
Customer Focus	v7	2.50	2.87	Medium
	v8	3.25		
Employee Focus	v21	2.75	3.06	Medium
	v31	3.37		
Performance measurement	v34	3.37	3.37	Medium
	v38	3.25		
	v39	3.5		
Average score			**3.10**	**Medium**

The results indicate that on average, the senior management perceive that the level of implementation of the factors identified in this study is medium at a score of 3.10. All three

factors had a score within the medium parameter as given on the scale in Table 5.12 above. These findings are further discussed in section 5.3.2.

Table 5.15 presents the results of the perceived implementation of the QM factors by middle management employees within NR.

Table 5.15: Perceived level of implementation of CSFs by middle management in NR (Source: The Author)

CSFs	Variables	Mean scores	Weighted Mean Score	Perceived level of implementation
Customer Focus	v7	3.26	3.42	Medium
	v8	3.57		
Employee Focus	v21	2.21	2.42	Low
	v31	2.63		
Performance measurement	v34	3.63	3.14	High
	v38	2.84		
	v39	2.94		
Average score			**2.99**	**Medium**

The results indicate that overall, the middle management perceive that the implementation of the QM in NR is medium at a mean score of 2.99. Both Customer focus and Performance measurement were perceived to be at a medium level of implementation which could indicate that middle managers perceive that the organisation is developing in the area of customer satisfaction and performance measurement. Implementation of Employee focus was perceived to be low at a score of 2.42, which could indicate that middle managers perceive that employees are not adequately trained to handle quality related issues and recognition of employees with outstanding performance is inadequate in the organisation. These findings are further discussed in section 5.3.2.

Table 5.16 presents the results of the perceived implementation of the CSFs by lower management employees in NR.

Table 5.16: Perceived level of implementation of CSFs by lower management in NR (Source: The Author)

CSFs	Variables	Mean scores	Weighted Mean Score	Perceived level of implementation
Customer Focus	v7	3.56	3.71	High
	v8	3.86		
Employee Focus	v21	2.47	2.54	Low
	v31	2.60		
Performance measurement	v34	3.82	3.66	High
	v38	3.56		
	v39	3.60		
Average score			**3.30**	**Medium**

These results indicate that on overall, the lower management perceive that the implementation of the QM is medium at a mean score of 3.30. Customer focus and Performance measurement factors were both perceived to have a high level of implementation which could mean that lower managers perceive that there is an established system in place to increase customer satisfaction and ensure performance measurement in the organisation. However, Employee focus was perceived to be at a low level of implementation with a mean score of 2.54 which could mean that lower managers perceive that the organisation is making an attempt at implementing this QM factor.

Table 5.17 presents the results of the perceived implementation of the CSFs by non-management employees within NR.

Table 5.17 Perceived level of implementation of CSFs by non-management in NR (Source: The Author)

CSFs	Variables	Mean scores	Weighted Mean Score	Perceived level of implementation
Customer Focus	v7	3.00	3.08	Medium
	v8	3.16		
Employee Focus	v21	2.83	2.58	Low
	v31	2.33		
Performance measurement	v34	4.00	3.77	High
	v38	3.50		
	v39	3.83		
Average score			**3.14**	**Medium**

These results indicate that on average, the non-management employees also perceive that the implementation of the QM in this organisation is at a medium level at a mean score of 3.14. The result for the perceived level of implementation of the individual factors indicated that all three factors fall on different parameters on the scale. Customer focus was perceived by non-managers to have a medium level of implementation with a score of 3.08, Employee focus was perceived to have a low level of implementation with a score of 2.58 while Performance measurement was perceived to have a high level of implementation with a score of 3.77. These findings are discussed in section 5.3.2.

Summary

The analysis of the implementation level of the factors identified in this study as perceived across management levels indicates that employees on different management levels perceive that QM implementation in NR is at a medium level. Further analysis of perceived level of QM implementation also indicated that all employees at all levels of management in this study, perceive that overall, the implementation of QM is at medium level.

This could be an indication that progress has been made in the deployment of QM initiatives in some areas within NR but there is still more to be done to establish a quality system which aligns all activities in the organisation with similar prerequisites and guidelines to convey consistency and quality at all levels (British Assessment Bureau (2019).

However, further analysis of the implementation of individual factors indicated that employees at different management levels perceive their level of implementation differently.

Across the management level, Performance measurement consistently had the highest score, Customer focus consistently had a medium score while Employee focus consistently had the lowest score. Senior and middle management perceived the implementation of performance measurement as medium while lower and non-management perceive the implementation of performance measurement as high. This result could indicate that lower and non-management might perceive that there is an effective communication system within the organisation that enables the effective evaluation of the performance of processes, products and services in the organisation but senior and middle managers might not perceive that performance is sufficiently established in the organisation to be effective for quality improvement.

Implementation of customer focus was perceived to be at a medium level by senior and non-management while middle and lower managers perceived the level of implementation of this factor as high. This result could indicate middle and lower manager perceive that an established system has been set in place for effective implementation of this factor but the senior and non-management staff perceive that although progress has been made in implementing this factor in the organisation, more work has to be done to establish this factor in the organisation.

Implementation of employee focus was perceived by middle, lower and non-management as low while senior management perceived the implementation level of this factor to be at a medium level. This result might indicate that senior management perceive that progress has been made in the continuous education and development of employees on quality related issues and in recognising employees who have performed very well in carrying out their jobs to improve quality but middle, lower and non-management employees do not perceive it that way. Middle, lower and non-management employees might perceive that attempts have been made in the organisation for education, development and recognition of employees but real progress has not been made in implementing initiatives that will establish this factor in the organisation. These results are further discussed in section 5.3.2 with support from qualitative data.

5.1.7   Results regarding external barriers hindering the implementation of QM

This section provides the results of the barriers hindering the implementation of QM in NR organisation. The barriers hindering QM implementation have been differentiated into external and internal barriers as already discussed in section 4.1.7.

Table 5.18: External barriers of QM implementation in NR (Source: The Author)

Barriers	Mean scores	Rank
Inadequate facilities is a challenge.	4.30	1
Abandonment of projects due to lack of funds is a challenge.	4.13	2
Inadequate infrastructure is a challenge	4.07	3
Delays in the completion of projects is a challenge.	4.04	4
Slow process of decision making is a challenge	4.02	5
Lack of innovation and creativity within the system is a challenge	4.00	6
Lack of availability of modern technology is a challenge	3.92	7
Lack of information flow from top management is a challenge.	3.77	8
Changes in projects already embarked upon is a challenge.	3.71	9

Table 5.18 shows the mean score for those barriers which prevent the implementation of QM in NR. The highest mean was 4.30 and the lowest mean was 3.71. The table shows that inadequate facilities, abandonment of projects due to lack of funds and inadequate infrastructure are perceived to be the biggest external barriers preventing the implementation of QM initiatives in NR. Lack of information flow from top management and changes in projects already embarked upon are perceived to be the least external barriers to the implementation of QM initiatives in NR. A study by Ab Rahman et.al (2011, p.621) identified lack of technological facilities as a major barrier to QM implementation, Sebastianelli and Tamimi (2003, p.52) identified insufficient infrastructure as a major barrier to QM implementation and Kosgie (2014) also identified lack of funds as barriers to QM implementation. These findings are further discussed in section 5.3.3 with support from qualitative data.

5.1.8 Results regarding internal barriers hindering QM implementation

This section presents results of the internal barriers (obstacles which are within the control of the organisation) to QM implementation as perceived by employees in NR. The respondents were asked about their views on the internal barriers to QM implementation as explained in section 4.1.8. The results are presented in descending order, from the factor perceived to be the major hindrance, to the factor perceived to be the least hindrance to QM implementation.

Table 5.19: Internal Barriers of QM implementation in NR (Source: The Author)

Barriers	Average scores	Rank
Lack of a recognition system	4.57	**1**
Lack of training programs relating to quality management.	4.41	**2**
Lack of top management commitment to QM implementation	4.37	**3**
Lack of a reward system.	4.30	**4**
Lack of commitment to quality strategy requirements	4.21	**5**
Lack of use of quality measurement.	4.14	**6**
Ineffective communication between the organisation and its customers	4.05	**7**
Poor organisational communication	3.83	**8**
Lack of focus on customer satisfaction	3.73	**9**
Lack of effective measurement of quality improvement	3.64	**10**
Resistance from employees	3.53	**11**

The highest mean was 4.57 and the lowest mean was 3.53. The table illustrates that lack of a recognition system, lack of top management commitment to QM implementation, and lack of training programs relating to QM are the major internal barriers preventing the implementation of QM in NR. Lack of effective measurement of quality improvement and resistance from employees was perceived to be the least internal barrier to QM implementation in NR. These findings for barriers preventing or limiting the implementation of QM are consistent with literature (Haque, Sarwar & Yasmin, 2013b, p.39; Pimentel & Major, 2016, p.1007; Abdullah et.al, 2013, p.871; Mosadeghrad, 2013, p.170)

Summary

The results of the quantitative analysis of the questionnaire suggests that the most recognised quality initiative perceived to be implemented is Quality control and Assurance. Factor analysis identified three CSFs for QM in NR, namely; customer focus, employee focus and performance evaluation. These results indicate that these findings are consistent with literature, Sadikoglu & Olcay (2014), Bajaj, Garg, Sethi (2018), Neyestani & Juanzon, (2016) and Lakshmi (2019) identified customer focus, Talib, Rahman and Qureshi (2010), Shafiq, Mirza, Abid & Naeem (2014) and Sabry (2014) identified Employee focus, Fryer & Ogden (2014), Salleh, Zakuan, Ariff, Bahari, Chin, Sulaiman, Yatim, Awang & Saman (2018) and Kundu & Manohar (2012) identified performance measurement as factors necessary for QM implementation.

Descriptive analysis showed that implementation of CSFs was generally perceived to be medium. Further analysis showed that there was a difference of opinion across management levels concerning the level of implementation of the individual factors identified in this study. Senior, middle and non-management level employees perceived the implementation of the customer focus factor to be medium while lower level management employees perceived this factor to be highly implemented. Senior management perceived the implementation of employee focus to be medium but middle, lower and non-management employees, perceived the implementation of this factor to be low. Senior and middle management level employees perceived the implementation of performance measurement to be medium while lower and non-management employees perceived the implementation of this factor as high. These variations in the perception can help senior management identify areas of improvement as was suggested by Holden et.al (2014, p.191)

The results of the barriers to implementation of QM initiatives indicated that the biggest external barrier is perceived to be inadequate facilities while the least external barrier is perceived to be changes in projects already embarked. The biggest internal barrier was perceived to be lack of a recognition system while resistance from employees was perceived to be the least internal barrier to QM implementation. These results indicate that these findings are consistent with literature (Haque et.al, 2013, p.39; Pimentel & Major, 2016, p.1007; Abdullah et.al, 2013, p.871; Mosadeghrad, 2013, p.170; Sebastianelli & Tamimi, 2003, p.52; Kosgie, 2014)

These results are further discussed in part 3 of this chapter with support from qualitative data gotten from interviews with employees in NR.

The next part of this chapter presents the thematic analysis of qualitative data obtained from interviews with employees of NR.

5.2. Qualitative analysis of interviews

This section presents findings from the qualitative data collected using interviews with staff of NR. Template analysis was adopted for analysis as discussed in section 3.2.8.1 A protocol was developed and used as a guide in conducting the analysis (also discussed in section 3.2.8.1). The interviews focused on exploring the understanding of quality and quality management (QM) among staff of this organisation and to explore the perceived key enablers as well as barriers to the implementation of QM initiatives in NR. The discussion centred on themes which included job roles, reason for QM implementation, improvement initiatives implemented, enablers of the implementation and obstacles to implementation of improvement initiatives in NR.

5.2.1 Characteristics of participants in the interviews in NR

Semi-structured interviews were conducted with two employees in NR. The interviewees included a middle manager who is a chief engineer and head of a unit within NR, and a lower management employee who is a principal engineer. The details of participants and their identifiers are presented in Table 5.20

Table 5.20: Interview participants and their identifiers in NR. (Source: The Author)

Name	Job level	Identifier
Participant 1	Middle manager	CEN
Participant 2	Lower manager	PEN

5.2.3 Analysis of interview themes

The protocol discussed in section 3.2.8.1 was used to develop themes from the interview transcripts. The themes drawn from the interviews are described below;

5.2.3.1 Organisation type

The first theme from the responses of the interviewees was the organisational type. From the responses, NR is a government owned organisation involved in the provision of a range of satellite products and services to other Nigerian government organisations, the Nigerian

citizens and organisations from other countries. It is also involved in the design of satellite subsystems and monitoring of the Nigerian satellite in space from the ground station. This theme was explored to meet the aim of this study which is to investigate QM implementation in Nigerian public sector organisations in the space industry. The responses from the interviewees confirm that this is a Nigerian PSO and the functions of the organisation confirm that it is in the space industry.

5.2.3.2 Job role

The second theme that arose from the interview was the job roles of the staff which gave an indication to their management levels within NR. The job roles of the interviewees included a middle management staff who is chief engineer and the head of a unit within NR and a lower management staff who is a principal engineer. According to the analysis of job roles of the participants' views in relation to implementation of quality initiatives in NR, CEN described his job role as:

"*I am the head of the customer relations unit. My job is to ensure customer satisfaction by meeting the needs or requests of the customer, available from our range of products....it involves end-to-end activities to ensure that at every point, customers are served correctly*"

PEN described his job role as:

"*My job responsibilities in the frequency management unit involves regulating and monitoring spectrum allocation for our services. We carry out frequency planning, assignment and coordination with other organisations using the same or different satellites to make sure there is no interference so as to obtain the maximum output*"

The job roles as explained by the participants gave the researcher an understanding of the role each employee plays in implementing QM within the organisation.

5.2.3.3 Quality concept

The third theme from the interviews was the general understanding on the concepts of quality and QM. Both participants associated their answers with for customer satisfaction. CEN described quality as "*when a customer gets value for what he/she is paying for and quality management is what we do continuously to make sure that our services are always available for our customers*"

PEN described quality as "*when a service is provided for a customer and he is satisfied*"

Looking at these definitions of quality from the participants, it can be seen that both responses refer to meeting customer needs and satisfying the customer (Oakland (1997, p.3).

5.2.3.4 Reasons for QM implementation

The fourth theme of the interviews discussed the reasons for the implementation of QM in the organisation. CEN was of the opinion that quality initiatives have been implemented in NR so that the organisation's products and services can compete well in the satellite industry both locally and globally. In his words;

"*QM is a global practice and if you don't practice it, you are not serious. Implementation of QM is necessary to evaluate and access your products and services using a particular benchmark. There are competitors in every industry and if our customers are not well taken care of, they will go to someone who can take care of them better than what we are doing*"

PEN was also of the same opinion. In his words;

"*Quality initiatives are implemented to improve our products and services. In order to keep our customers, we find out their complaints, identify the problem, define it and then proffer solutions to these problems so that our customers will not leave us*"

These responses are also consistent with those found in literature such as Sadikoglu and Olcay (2014, p.4)

5.2.3.5 Ways quality management has been implementation

In the fifth theme, participants were asked to identify quality initiatives are been implemented in the organisation to bring about improvement.

- Customer satisfaction survey, according to PEN "*we usually carry out a customer satisfaction survey to get a review of the service they have been getting from us. From this survey we identify the complaints and a committee which has been formed consisting of technical staff, service engineers and sales support staff, investigates these issues and to find solutions to these complaints*"

- Having a customer relations unit as PEN explains "*we have a customer relations unit that coordinates the interaction between customers, marketers and engineers who design products and services.*"

- Continuous monitoring of the system. CEN elaborates on this "*we continuously monitor the system and take periodic readings so that issues in the system can be identified quickly and resolved immediately*"

- A level of authority is given to employees to handle issues based on management level. CEN explains this saying "*every staff is given a level of authority to deal with abnormalities discovered in the system. If an employee's level of authority does not solve the problem, there is a procedure for immediate escalation to the next level*"

- Quality circle, according to PEN *"a committee has been set up by senior management, whose members are made up of employees from different departments in the organisation. This committee uses the information we collect from customers to strategize and proffer solutions to issues we have with our customers"*

- Having effective inter-communication between management levels. PEN explains *"there has been openness between the senior management and the rest of the staff in the organisation. Staff suggestions are normally sent to senior management who look into them and organise meetings to discuss it further with the staff."*

These practices are consistent with quality management practices mentioned in literature such as Zakuan et.al (2012, p.26) and Bouranta et. al (2019, p.10)

5.2.3.6 Enablers of quality management implementation in NR

The sixth theme drawn from the interviews was the enablers of quality management implementation within the organisation. Those enablers identified were senior management commitment, CEN explains this *"there are monthly meetings in which the Managing Director discusses what has been achieved and new strategies for quality improvement. These meetings are to sensitise the staff and keep everyone in sync with the organisation's objectives."*

Free flow of information and having a two-way communication system were also identified as enablers of QM implementation, PEN explains *"there has been openness between the senior management and the rest of the staff in the organisation. Staff suggestions are normally sent to senior management who into them and organise meetings to discuss it further with the staff."*

These findings are consistent with findings of Patro (2013, p.2693) and Orumwense (2014).

5.2.3.7 Barriers (external obstacles) preventing QM implementation

The seventh theme from the interviews was external barriers which serve as obstacles to implementing quality initiatives and are out of the control of the organisation. The barriers mentioned were

- Government influence in terms of policies such as placing an embargo on recruitment of staff and on staff trainings done outside of Nigeria, CEN explains how this is affecting QM implementation the organisation *"the embargo on staff recruitment in our organisation has led to a shortage of hands to carry out projects. Also, the embargo on staff training done outside of Nigeria is also affecting quality improvement in our organisation because there is a lack of local competency in skills required in this particular industry".*

- Government influence in terms of funding; CEN explains how this is affecting the organisation "*inadequate funds from budgetary has caused a lack of the necessary equipment (hardware and software) to carry out projects*".
- Inadequate infrastructure in terms of inadequate power supply due to the epileptic power generation in the country. PEN had this to say, "*the cost of providing power supply in the organisation has increased the cost of production which has had a negative impact on the profits generated by the organisation.*"

These responses are all consistent with literature such as Arshida et.al (2013, p.258) and Khan (2011, p.156).

5.2.3.8 Barriers (internal obstacles) to quality management implementation

The eighth theme from the interviews was internal barriers which serve as obstacles to implementing quality initiatives and can be controlled by the organisation. The barrier mentioned was;

- Lack of training of employees, CEN and PEN both spoke about lack of training for QM in NR. CEN "*we have a challenge in the area of staff training. Trainings which will expose staff to various opportunities and different scenarios within the industry on how to tackle different problems when they arise and capacity building trainings on how handle your job*".
- Resistance from management; PEN explain how this is a barrier "*there is politics everywhere, some people have vested interest in some things and don't want things to work. Some believe you want to take their jobs from them*"

These findings are consistent with literature, Kosgie (2014, p.14) and Abdullah et.al (2017) highlighted the effect resistance from middle management can have in hindering or limiting the implementation of QM.

5.2.3.9 Benefits of implementation of QM

The ninth theme drawn from the interview was the perceived benefits from implementing quality management. Some of the benefits were

- Staff were more motivated to carry out their jobs.
- Increased customer confidence in the organisation's products and services

PEN stated that "*implementing quality management initiatives has transformed our organisation and moved it from one level to a better level. Our customers now have more confidence in our services*"

Other benefits indicated were;

- Award of more contracts
- Growth of customer base

According to CEN, "*after launching our second satellite in 2009, and improving on the quality of our products and services, we have been awarded more contracts, one of which I have been managing for 3 years now and there has been continuous increase in our customer base*"

Similar benefits have been identified in literature such as Ab Rahman et.al (2011, p.621)

5.2.3.10   Suggested ways improvement

The tenth theme drawn from the interview was suggestions from the participants of possible improvements that can be done in NR. The suggestions mentioned were;

- Training for staff

- Government policies should be carried out after consultations with organisations in different industries before implementation. CEN suggested this saying *"the government should consult with organisations before implementing policies and considerations should be made for organisations in some industries such as ours* (space industry) *because some policies are affecting us and our performance*"

5.14 Interview Analysis Summary

The interviews with the employees of NR discussed the job role of the employees, their understanding of the quality concept and the reason for the implementation of quality improvement initiatives within NR. The interviewees also described the key enablers and benefits of improvement efforts, barriers to improvement efforts and suggested improvement possibilities that can be done in NR.

The analysis of the interviews pointed to the understanding of the quality concept in NR. The concept of quality and QM described by most of the interviewees was in line with identification of customer needs and satisfying those needs.

The interviews revealed that the implementation of QM initiatives in the organisation was to remain competitive and grow the organisation's customer base. Other reasons given for the implementation of QM initiatives include improvement of the organisation's products and services and to identify and satisfy customer requirements. Literature confirms that these

reasons stated for the implementation of QM as other authors have identified (Polat, et.al, 2011, p.1118; Lakhe & Mohanty, 1994, p.21; To et.al, 2011, p.67)

In terms of key enablers to QM implementation, analysis showed senior management's commitment to implementing strategic development objectives. Furthermore, the participants identified free flow of information and effective communication. The key enablers or success factors from the thematic analysis of the interviews are consistent with the success factors found in the analysis of the questionnaires and those found in literature (Kundu & Manohar, 2012; Bigliardi, & Galati, 2014; Zubair, 2013)

More so, the participants described several issues that hindering or limiting the implementation of quality initiatives in the organisation which include the influence of government policies on improvement efforts in the organisation, as NR is a government owned organisation, its operations are affected by policies set up by the Nigerian government. Insufficient budgetary allocations for the organisation was said to be the cause of lack of resources necessary for QM implementation. Other barriers mentioned were; resistance from middle management and a lack of training in the quality management concept. These findings are consistent with literature and have been identified by authors such as Kosgei (2014, p.16) and Suleman & Gul (2015, p.126)

Furthermore, the interviewees offered suggestions for ways in which quality management can be implemented in NR. The suggestions included continuous training of staff in quality related issues, according to the interviewee. Another suggestion was a review with the formulation and implementation of government policies.

The next section will discuss the findings from the analysis of the quantitative of the questionnaires with support from the qualitative analysis of interviews.

5.3   Discussion of quantitative and qualitative analysis

This section discusses the results that emerged from both the quantitative and qualitative analysis of the questionnaires and interviews in NR. In this section the research findings are discussed and linked to the relevant literature to achieve the research objectives.

5.3.1 First objective: to determine the definition of quality and identify the QM technique implemented for quality improvement within NR

The results of the analysis of the quantitative data indicated that quality control/assurance was most recognised QM technique applied for quality improvement in NR when participants were asked to choose the QM approach applied for quality improvement within the organisation. However, a large proportion of the research population in this study did not know the QM technique that has been adopted for quality improvement in NR. This could be as a result of the absence of a clearly defined approach or set of approaches adopted across the entire organisation, aligning all activities with similar prerequisites and guidelines to achieve consistency and quality at all levels (British Assessment Bureau (2019). The absence of a clearly defined QM approach could be the reason why a large proportion of the study population did not know the QM technique applied for QM implementation in NR.

From analysis of the interviews, the definition of quality as discussed in section 5.2.3.3 seems to resonate a focus on customer satisfaction. The definitions of the quality concept by employees from NR in this study align with Oakland's (1997, p.3) definition of quality- *"Quality is meeting customer requirements"*. One of the interviewees also spoke about continuous monitoring of processes to identify abnormalities and quickly resolve issues (section 5.2.3.5). This might indicate the use of quality control as the main QM approach in the organisation.

5.3.2 Second objective: to determine the factors of necessary for QM implementation in NR and the level of implementation based on the perception of employees.

The analysis of questionnaires and interviews identified three CSFs for QM in NR; Customer focus, Employee focus and Performance measurement. All three identified factors are consistent with literature as discussed below;

5.3.2.1 Customer focus- The results from the questionnaire revealed that customer focus in the organisation was perceived to be medium as shown by a total mean value of 3.34, determined on the five-point Likert scale. The qualitative analysis of the interviews conducted with employees at different management levels within NR supported this finding from the quantitative analysis. The employees interviewed recognised the importance of customer focus with regards to implementing QM at NR, however both quantitative and qualitative results confirmed that there was not enough commitment to the implementation of the factor. This perception of a lack of commitment to customer

focus could be as a result of the lack of resources to carryout projects in the organisation in order to meet customer needs (see section 5.1.7 and sections 5.2.3.7). It could also be due to a lack of training of staff as identified in sections 5.1.8 and section 5.2.3.8. Employees might not be trained well enough to handle quality related issues which could bring about an improvement in quality of products and services to the satisfaction of the customer. This lack of training was linked to the embargo placed on foreign training of staff, as discussed in section 5.2.3.8.

These findings are consistent with other studies such as Ullah, Ajmal and Aslam (2016, p.44), Sharabi, (2015, p.116) and Chai (2009, p.370) indicating that focusing on customer needs is important for quality improvement.

5.3.2.2 Employee focus- from the analysis of the questionnaire, this factor was perceived to be the lowest factor implemented. A statement by PRE indicated that the lack of training of employees could be the reason for this result. Lack of training of employees in quality related issues was also recognised as the biggest internal barrier to QM implementation within this organisation. Studies have shown that employee training is one of the key elements in employee focus (Azeem, Rubina & Paracha, 2013, p.696). The studies by Zakuan, et.al (2012, p.28), Bigliardi and Galati (2014, p.167) and Bouranta, et.al (2019, p.13) all identified training as important factor to implementing quality in service sector organisations.

Recognition and reward are also key elements which should be implemented to indicate a focus on employees. Research has shown that employees are motivated when their contributions in the organisation are recognised and rewarded (Nasir, 2015, p.6; Ali & Ahmed, 2009, p.271)

5.3.2.3 Performance measurement- from the questionnaire analysis, this factor had the highest overall perceived level of implementation with a medium score of 3.42 on Table 5.13. Senior and middle management employees perceived this factor to be at a medium level of implementation while lower and non-management employees perceived this factor to be highly implemented. In section 5.2.3.4, CEN stated that NR's services and processes were benchmarked with global best practices from other organisations in order to improve. Performance evaluation of employees are also carried out annually and areas of improvement communicated to staff. Performance measurement helps organisations achieve their goals by monitoring and improving the performance of individuals, departments and units within organisations. This factor is important in public sector organisations to provide accountability for public funds spent, it is also

important for providing more effective public services (Rouse, 1999, p.76). According to the interviewees, NR is implementing this QM factor by carrying out performance appraisals, setting key performance indexes for units and departments and benchmarking against world best practices.

5.3.3 Third objective: determine the barriers to implementation of QM factors in NR.

Analysis of the questionnaire showed that inadequate facilities, abandonment of projects due to lack of funds and inadequate infrastructure were the biggest external barriers facing the implementation of quality improvement in the organisation. Analysis of the interviews revealed that the lack of facilities and infrastructure was as a result of inadequate funding from the government budget. Projects were abandoned because they could not be funded from the insufficient funds allocated to the organisation from the government budget. CEN stated that funds allocated for projects were most times diverted to other issues such as buying gas to generate electricity for the organisation so as not to disrupt services provided to customers.

Analysis of the questionnaire also showed that lack of a recognition system, lack of top management commitment to QM implementation, and lack of training programs relating to QM were the biggest internal barriers to quality implementation in NR. This point was reiterated in the interviews by PRE in section 5.2.3who stated that lack of employee training was a major challenge in the organisation. Resistance from some management staff due to fear of loss of statues was also identified as a barrier in the interviews. This result is consistent with the study by Kosgei (2014, p.16) of the challenges facing the implementation of QM in a public school in Kenya. This study found that a lack of commitment by the management and insufficient training of key team players where some of the challenges to QM implementation.

Conclusion

This chapter presented the analysis and findings of the data collected through questionnaires and interviews in NR. Through factor analysis three factors were identified for QM implementation in NR which are; customer focus, employee focus and performance measurement. Descriptive analysis to determine the level of QM implementation in NR produced a result indicating that the level of implementation of QM is medium. Further analysis in section 5.1.6 indicated that there are differences in opinion across management levels concerning the level of implementation of the QM factors identified in this study. In section 5.1.7, the major external barriers to QM implementation were identified as inadequate facilities, inadequate infrastructure and

abandonment of projects already embarked on, while major internal barriers to QM implementation in NR were identified as lack of a recognition system, lack of training programs relating to the QM and lack of management commitment to QM implementation.

Findings from the interviews also provided support to the findings from the questionnaire results as lack of funds was identified as a major factor inhibiting implementation of QM in NR. Inadequate facilities, inadequate infrastructure and abandonment of projects already embarked on were all linked to lack of funding from the government. The interviews also echoed the perceived level of implementation of QM which was found to be medium. The interviewees suggested areas of possible improvement which included continuous training of staff in quality issues and reforms in government policy formation to accommodate organisations like theirs which are pace setters within their industry.

The next chapter presents a cross case analyses of the data collected from both organisation in this study of QM implementation in Nigerian public sector organisations.

CHAPTER 6

CROSS CASE DATA ANALYSIS

6.0 Introduction

This chapter presents a cross case analysis to compare the findings from the two case organisations used in this study. Critical success factors common to both organisations are identified and their level of perception are compared. The external and internal barriers hindering the implementation of QM in the both organisations are also compared to identify similarities and differences.

This chapter is again divided into three parts. Part 1 presents the quantitative analysis of data collected from both organisations using questionnaires and compares the results. Part 2 presents the qualitative analysis of data collected using interviews and Part 3 is the discussion of the findings of the quantitative and qualitative analysis of the questionnaires and interviews.

6.1. Questionnaire analysis

The analysis begins with a cross case analysis of the respondents' demographic information. The second section presents a cross case descriptive analysis of what is perceived by respondents to be the quality improvement technique(s) implemented within the organisations. The third section presents a cross case analysis of critical success factors identified in each organisation and the results of the factor analysis, content validity and reliability tests for the variables used in this study to identify the critical factors of QM implementation in both organisations. The fourth section is a cross case analysis of the level of implementation of the identified critical success factors of QM. The fifth section is a cross case analysis of the external barriers hindering the implementation of QM in each organisation and the last section is a cross case analysis of the internal barriers to QM implementation within both organisations.

6.1.2 Sample Characteristics

To analyse the questionnaire findings, descriptive statistics which dealt with the respondents' profiles, was employed. These concerned various demographic factors such as gender, age, educational level, position in the organisation and years of experience with the organisation as shown in Table 6.1

6.1.2.1 Gender

Table 6.1 shows that a high percentage of participants in this study were male in both organisations, 71% in SD and 82% in NR. This result indicates that the majority of people who participated in this study are male. The results agree with a study by the [9]Nigerian Bureau of Statistics (2015), which indicated that the proportion of the male population employed in federal government agencies was consistently higher than for females across, all management levels. The percentage of women employed between 2014 and 2016 for both senior and lower level positions, was below 42% (Nigerian Bureau of Statistics, 2015). This finding indicates that the number of male employees is more than the female employees in both case organisations.

6.1.2.2 Age of respondents

Table 6.1 also shows that the majority (46% in SD and 52% in NR) of the respondents in both organisations in this study are aged between 21 and 40 years, which typically represents the young age of Nigerians. According to a publication by the American Central Intelligence Agency (2019), Nigeria is a relatively young society with 30.4 percent of the population within the 25-54 age group.

6.1.2.3 Level of Education

As shown in Table 6.1, majority of the participants in both organisations have a master's degree, 54% in SD and 46% in NR. 6% of the respondents in SD have a diploma while 9% have a diploma in NR, 31% of respondent in SD have a bachelor's degree while 34% have a bachelor's degree in NR. 9% of respondents in both SD and NR have a doctoral degree. This result indicates that respondents in this study from both organisations are educated and might have had little or no problem with understanding and completing the questionnaire.

6.1.2.4 Current Position

With regard to the distribution of respondents by hierarchical level, Table 6.1 shows that majority of respondents from SD (56%) are middle managers while majority of respondents from NR (41%) are lower managers.

6.1.2.5 Years of Experience

Table 6.1 shows that majority of respondents in SD and NR have more than 5 years' experience in their respective organisations. Overall, 72% of the respondents in this study have worked for

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[9] Website Source

more than five years in the space industry. It is worthy to note that the Nigerian space industry is a young sector which came into effect after the signing of the Nigerian National Space Act in 1999 and started operations in year 2000. Most of the respondents (80%) in this study have between 5 to 15 years' experience within this sector. This result indicates that the respondents in this sample have adequate experience within this sector to be able to provide information on QM implementation in both organisations.

However, when comparing the two case organisations, the following similarities and differences can be observed;

Similarities observed were;

- The results showed that 85 percent of the respondents were aged between 21 and 40 years in both organisations.
- 10 percent of the respondents have a doctorate degree in both organisations. Over half of the respondents in SD (54%) have a master's degree and 48% have a master's degree in NR, which can be considered to be similar proportions.
- More than 80 percent of the respondents have over 5 years' experience within both case organisations.

Difference observed were;

- Over half of the respondents from SD (56%) are middle managers while 41% of respondents from NR are lower managers.

These statistics indicate that the study population are well educated and probably had little or no challenge in completing the questionnaires. It also indicates that there is the possibility of the perceptions of the middle managers in SD and lower managers in NR, having an impact on the overall results of this study.

Table 6.1 below summarises the combined results of the demographic information from both case organisations.

Table 6.1: Demographic information of respondents (compiled by the Author)

	Frequency SD	SD %	Frequency NR	NR %	Total Frequency	Total %
1. Gender						
Male	48	71	46	82	94	76
Female	20	29	10	18	30	24
Total	68	100%	56	100%	124	100%
2. Age						
21-30	31	46	30	54	61	49
31-40	27	40	18	32	45	36
41-50	9	13	8	14	17	14
≥ 51	1	1	0	0	1	1
Total	68	100%	56	100%	124	100%
3. Educational level						
Diploma	4	6	5	9	6	5
Bachelor's degree	21	31	19	34	40	32
Master's degree	37	54	27	48	66	53
Doctoral degree	6	9	5	9	12	10
Total	68	100%	56	100%	124	100%
4. Current Position of respondents						
Senior management	5	7	8	14	13	10
Middle management	38	56	19	34	57	46
Lower management	15	22	23	41	38	31
Non-management	10	15	6	11	16	13
Total	68	100%	56	100%	124	100%
5. Years of experience						
< 5 years	10	15	11	20	23	18
5- 10	57	84	34	62	89	72
11-15	1	1	9	16	10	8
16-20	0	0	1	2	2	2
Total	68	100%	56	100%	124	100%

Despite these variations, the results of the demographic information show an adequate representation for all demographic factors used in this study.

6.1.3 Cross case analysis of QM technique implemented within both case organisations for quality improvement.

This section presents the result of the QM technique/techniques perceived to be implemented for quality improvement within each organisation. Respondents were asked to identify a technique or techniques that are being applied for quality improvement where more than one technique could be identified by a respondent. The technique with the most points was judged by the researcher to be the main QM technique perceived by employees to be implemented in both organisations. Respondents were also provided the opportunity to add other QM techniques that had not been already stated in the questionnaire. The results are presented in Table 6.2 below;

Table 6.2: Quality Management techniques implemented for quality improvement in both organisations as perceived by respondents (Source: The Author)

Quality Management techniques	% SD	% NR
Quality control/Quality assurance	49%	34%
I do not know	17%	37%
TQM	15%	7%
Lean management	7%	12%
5S	5%	0
Quality Circles	5%	0
Just-In-Time	1%	9%
Lean Six Sigma	1%	1%
Six Sigma	0	0
Total	100%	100%

From Table 6.2 above, similarities and differences can be observed when comparing SD and NR based on the responses concerning the QM technique or techniques implemented in both organisations. For similarities, Quality control/Quality assurance (QC/QA) was perceived to be the main QM technique implemented in both organisations. Similarly, with no response, Six Sigma was not recognised by any respondent as a QM technique implemented in either of the organisations. Differences observed when comparing responses from both organisations are; Firstly, in SD, the technique with the highest number of responses (49%) shows that QC/QA is the main QM technique perceived to be implemented, however, this was not the case with

NR. In NR, the highest number of responses (37%) indicated that they do not know what QM technique is implemented for quality improvement in the organisation. Secondly, out of eight QM technique stated on Table 6.2, responses from SD indicated that seven of the QM techniques; QC/QA, TQM, Lean management, 5S, Quality circles, Just-In-Time and Lean Six-Sigma, are perceived to be implemented to a certain degree in SD but in NR, responses indicated that five of the QM techniques, QC/QA, TQM, Lean management, Just-In-Time and Lean Six-Sigma are perceived to be implemented.

As already stated in sections 4.3, this result suggests that SD might have implemented quality control/assurance as its main technique to quality improvement, while integrating other QM techniques in some of its processes. The results for NR suggest that the organisation might not have a clearly defined QM implementation approach geared towards delivering quality products and services or it might indicate that employees lack training in QM concepts and therefore do not recognise QM implementation approaches. This finding is further discussed in section 6.3.

6.1.4 Cross case analysis of the CSFs of QM implementation in each case organisation

Results of factor analysis identified three CSFs in each organisation. In SD, CSFs identified through factor analysis were; Management commitment, Employee Engagement and Strategy Deployment while CSFs identified through factor analysis in NR were Customer focus, Employee focus and Performance measurement. The CSFs identified in each organisation are completely different and that is why studies have encouraged organisations to tailor the QM implementation to their individual circumstances (Stringham, 2004, p.185; Mansour & Jakka, 2013, p. 101).

In the next section, factor analysis using the whole study population of 124 respondents, was carried out to identify the common critical factors for QM implementation across both organisations. This was done to see if the same CSFs identified in the separate factor analysis of each organisation will be identified when factor analysis is done together.

6.1.4.1 Factor Analysis

Factor analysis was carried out to establish the QM implementation factors following the six-step protocol discussed in section 4.1.4. This protocol has already been discussed in detail, therefore, only the results of the factor analysis using the steps outlined in the protocol are presented here.

Step 1: Determine data suitability for data analysis

i. Sample size - Responses from both organisations were added together to make up the sample size was 124 with 45 variables.

ii. Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy/Bartlett's Test of Sphericity- The result of the KMO was greater than 0.5 at 0.902 and Bartlett's test of sphericity had a significance of ($p = 0.000$) Meaning that the data was fit for factor analysis and there was a significant correlation among the variables as shown in Table 6.3 below.

Table 6.3: KMO/Bartlett's test of sphericity 1 (Source: The Author)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.902
Bartlett's Test of Sphericity	Approx. Chi-Square	5339.812
	df	990
	Sig.	.000

Step 2: Factor extraction

As explained in section 4.1.4, PCA is the method used for factor extraction in this study.

Step 3: Determining criteria for retaining factors

The cumulative percent of variance extracted, the Kaiser's criteria (eigenvalue > 1 rule) and the Scree test were the criteria used for retaining factors.

i. Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) - Table 6.4[10] below indicates a cumulative percentage of variance of 75%, highlighted on the table (meaning that there are more than enough factors to meet the specified percentage of variance explained) and a total of eight factors having an eigenvalue > 1.

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[10] Table 6.4 is a reduced table. The full table can be found in Appendix 11.

Table 6.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) 1 (Source: The Author)

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	19.806	44.013	44.013	15.041
2	4.201	9.335	53.348	13.330
3	2.321	5.158	58.506	14.877
4	2.042	4.537	63.044	6.401
5	1.770	3.933	66.976	9.484
6	1.447	3.216	70.193	11.659
7	1.265	2.812	73.005	6.567
8	1.030	2.290	75.294	1.933

This result of this table indicates that eight factors could be retained from the analysis.

ii. Scree test
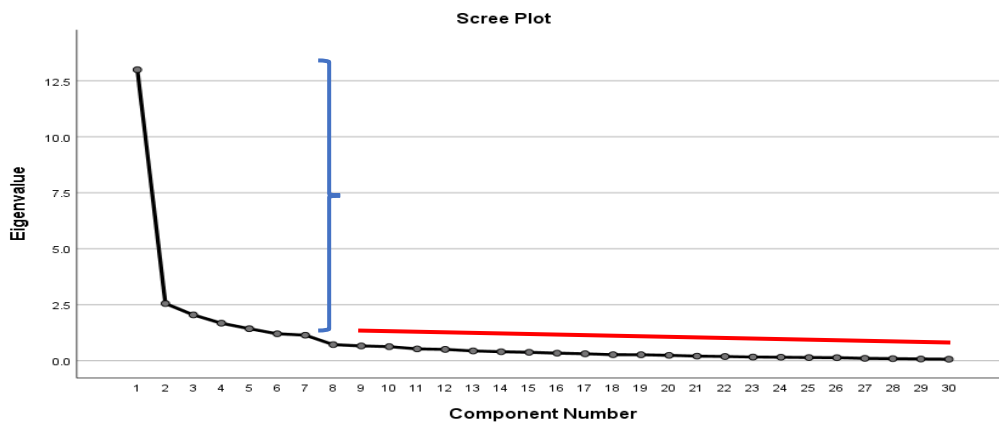
Figure 6.1: Scree plot 1 (Source: The Author)

The Cumulative Percentage of Variance, Kaiser's rule (Eigenvalue > 1) and Scree plot for the data set used for this study, suggests that eight factors can be retained for interpretation. However, to produce a more interpretable and simplified solution, the result was rotated as explained in section 4.1.4

Step 4: Selection of Rotational Method

The oblique promax rotation was used to simplify the interpretation of factors. Based on the guidelines of Hair et al. (2014, p.115), limit for the factor loading analysis was 0.50 given that the sample size is 124 as presented in Table 4.4, section 4.1.4.

The pattern matrix table was examined to find that eight factors were identified but some variables did not load or were unable to be assigned to a factor using a factor loading of ≥0.50 as stipulated by Hair et.al (2014, p.115) guidelines. Table 6.6 below is the Pattern matrix showing eight factors identified by the analysis.

Table 6.5 Pattern matrix of showing eight factors (Source: The Author)

Variables	Components							
	1	2	3	4	5	6	7	8
v1		1.016						
v2		1.068						
v3		.811						
v4		.747						
v5							.811	
v6							.737	
v7								.514
v8								
v9			.576					
v10							.501	
v11								
v12								
v13								
v14								
v15		.516						
v16						1.041		
v17						.933		
v18			.837					
v19			.951					
v20			1.115					
v21			.781					
v22			.686					
v23				.722				
v24	.514							

v25								
v26	.619							
v27			.566					
v28	.646							
v29	.542							
v30								
v31				.765				
v32				.722				
v33								
v34	.748							
v35	.730							
v36	.987							
v37	.854							
v38	.705							
v39	.931							
v40				.789				
v41				.698				
v42				.667				
v43				.771				
v44								
v45								

Results in Table 6.6 indicated that some variables could not load on any factor and therefore have to be eliminated. The elimination of variables created a change in the model parameters after re-running the analysis to obtain a result where all variables were assigned to a factor. After re-running the analysis, results indicated that the KMO was still adequate at 0.887 and the Bartlett's test for sphericity still had a significance of p=0.000. Meaning that the sample was still adequate for factor analysis (Tabachnick & Fidell, 2007, p.614) as shown in Table 6.7 below,

Table 6.6: KMO and Bartlett's test of Sphericity 2 (Source: The Author)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.887
Bartlett's Test of Sphericity	Approx. Chi-Square	3043.522
	df	435
	Sig.	.000

The results from the Cumulative Percentage of Variance at 83% variance and a scree plot indicated a cumulative percentage of variance at 76% (highlighted on Table 6.8) and seven factors extracted as shown in Table 6.8[11] and figure 6.2 below.

Table 6.7 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) 2 (Source: The Author)

Total Variance Explained				
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	12.995	43.316	43.316	9.119
2	2.552	8.507	51.823	9.073
3	2.044	6.813	58.636	8.457
4	1.674	5.579	64.215	6.296
5	1.428	4.760	68.975	6.594
6	1.199	3.998	72.973	5.475
7	1.138	3.793	76.767	4.574

iii. Scree plot 2
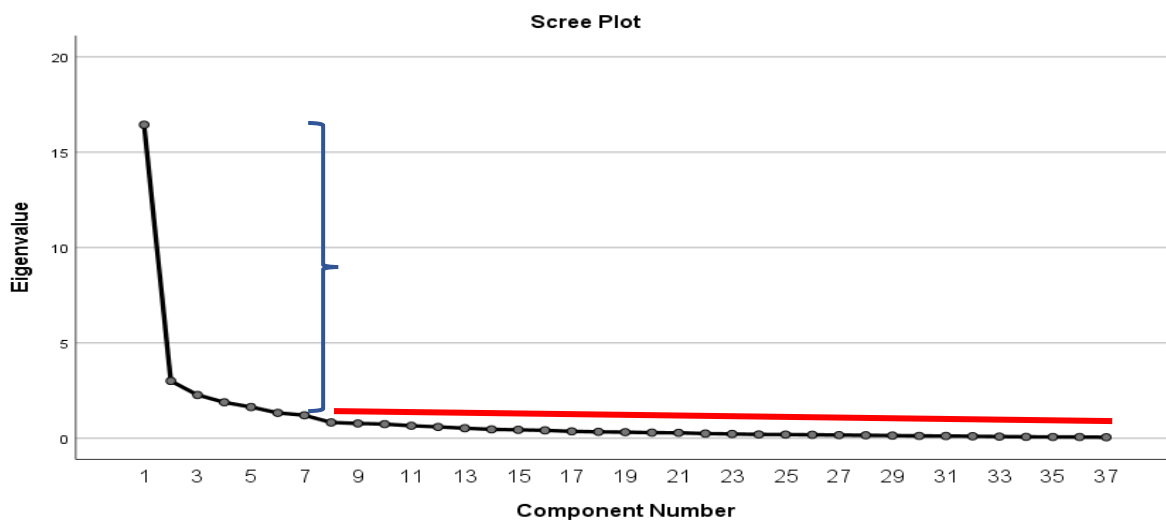
Figure 6.2: Scree plot 2

After re-running the analysis, a total of 15 variables did not load or were unable to be assigned to a factor and therefore, eliminated. The variables eliminated include; v8, v9, v10, v11, v12,

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[11] Table 6.7 is a reduced table to show eigenvalues >1. The full table can be found in Appendix 11.

v13, v14, v24, v25, v27, v29, v30, v33, v44, v45. The pattern matrix as presented in Table 6.9 below indicates that all the remaining 30 variables load on seven factors.

Table 6.8: Pattern matrix of showing seven factors (Source: The Author)

Variables	Components						
	1	2	3	4	5	6	7
v1			.980				
v2			1.009				
v3			.766				
v4			.644				
v5							.785
v6							.756
v7							.501
v15			.533				
v16						.927	
v17						.834	
v18		.763					
v19		.901					
v20		1.000					
v21		.831					
v22		.715					
v23					.809		
v26					.566		
v28	.552						
v31					.840		
v32					.775		
v34	.712						
v35	.698						
v36	.922						
v37	.800						
v38	.667						
v39	.853						
v40				.759			
v41				.717			
v42				.606			
v43				.751			

Step 5: Reliability test

The acceptable level of reliability-coefficient-alpha is 0.70 or greater. Therefore, any alpha coefficient that is below 0.70 must be dropped from the analysis as unreliable (Hair et al., 2011, p, 123). The results of the test of the reliability of the measures is shown in the Table 6.10 below

Table 6.9: Cronbach's alpha result (Source: The Author)

Factors	Cronbach's alpha
F1	0.902
F2	0.801
F3	0.916
F4	0.919
F5	0.842
F6	0.904
F7	0.881

As shown in Table 6.10, the alpha coefficients for all QM factors identified were all greater than 0.70 indicating that the survey is reliable and the data collected can be used for further analysis (Lawrence, 2017, p.7)

Step 6: Interpretation and Labelling

Interpretation and assigning of labels to the seven extracted factors were done as explained in sections 4.4.

Factor 1: consists of five variables v1, v2, v3, v4 and v15;

V1- Senior management have clear vision toward quality, this guides all aspects of running our organisation.

V2- Senior executives are visibly and explicitly committed to quality.

V3- Top management allocates adequate resources for quality management efforts.

V4- Top management allocates adequate time for quality management efforts.

V15- There is strategic quality planning of the long-term quality journey.

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Variables under this factor connote commitment of top management to quality management implementation. Studies have stressed that top management commitment is required for QM implementation to be successful (Deming, 1986, p.21; Juran, 1995, p.142; Al-Ibrahim, 2014, p.322; Nasim, 2018, p.1017). Senior management can show commitment to the successful implementation of quality initiatives within their organisations by setting up QM objectives and strategies, providing and allocating necessary resources, showing interest and contributing to quality improvement efforts, and assessing QM implementation and performance (Mustafa & Bon, 2012, p.11029). This factor has been labelled Management Commitment.

Factor 2: consists of three variables v5, v6 and v7.

V5- Top managers often discuss the importance of quality at general meetings.

V6- Top managers support any change required in structure in order to promote the new culture.

V7- In my organisation, there is comprehensive identification of customer needs.

This factor has been labelled Organizational Culture Change because inculcating a quality-oriented culture necessitates a change of attitudes and beliefs among employees and a change in structure, systems and processes where required, to achieve organisational objectives and satisfy customer needs (Ramseook-Munhurrun, Munhurrun, Panchoo, 2011, p. 69). Change in an organisation's culture requires support of top management as Huq (2005, p.453) recognises. Some authors argue that the organisational culture is usually an extension of the national culture which has a substantial effect on conduct in public organisations (Douglas & Douglas, 2015, p.5; Al-Ibrahim, 2014, p.131). This argument is further strengthened when considering the differences in approach of Japanese workers as compared to American, European or Nigerian workers. For example, if a country's national culture places a lot of value on loyalty or seniority rather than performance of its employees, the criteria for recognition, reward or even promotion in organisations might be dependent on the loyalty or seniority of employees and not on performance.

Kozhevina, Balunova, Yurchenko, Trifonov & Guseva (2015, p.4) maintain that quality management systems in public sector organisations are usually determined by the government which provides it with a structural and functional framework. However, this culture has to be reviewed and adjusted to be in harmony with the organisation's objectives so as to improve on efficiency (Patro, 2013, p.2692). Carrying out changes within the organisation can be a major challenge, therefore, senior management must be able to convince the employees and external

stakeholders by creating a convincing vision for the future of the organisation which must be easy to communicate and that the employees find attractive (Fernandez & Rainey, 2006, p.169)

Factor 3: consists of two variables v16 and v17;

V16- Mission statements cover the whole organisation.

V17- Vision statements cover the whole organisation.

This factor has been labelled Strategic Policy Deployment. Organisational policies include mission and vision statements. Effective leadership should develop a clear mission statement and then build up strategies to support the mission. They should provide vision of where the organisation is going with its quality efforts (Juran, 2010, p.77; Sadikoglu & Olcay, 2014, p.5). This factor involves the formulation of mission and vision statements and quality policy and deployment of such plans to enable QM implementation (Oakland 2003, p.36; Yeng, Jusoh & Isak, 2018, p.3)

Factor 4: consists of five variables v18, v19, v20, v21 and v22;

V18- Training in the total quality concept is given to all employees in the organisation.

V19- Employees are trained to improve interactive skills (such as communication skills, effective meeting skills, and leadership skills).

V20- Employees are trained in problem identification and problem-solving techniques

V21- Seminars and workshops in quality issues are arranged for employees as part of an on-going process.

V22- Training and education cover the entire workforce.

All variables under this factor point to the training of employees. Training of employees in areas of problem identification, problem solving, and quality improvement skills is important for the successful implementation of QM in organisations (Ajayi & Osunsanmi, 2018, p.1759; Oakland, 1993, p. 309). Training in interpersonal skills such as communication skills, effective meeting skills, and leadership skills is also needed to develop the ability to work well in teams and manage job roles, (Sivalogathasan, Gamini & Senanayaka, 2012, p.4). This factor has been labelled Employee Training.

Factor 5: consists of five variables v23, v26, v31 and v32;

V23- The organisation encourages employees to suggest ideas for work improvement

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V26- The organisation implements employees' suggestions.

V31- There is recognition for outstanding performance in the organisation.

V32- There is reward for outstanding performance in the organisation.

Variables under this factor connote involvement of employees in the quality journey by encouraging suggestions for continuous improvement, implementing such suggestions, recognising outstanding performances and rewarding employees. According to some studies, recognising and rewarding employees motivates and strengthens loyalty of employees towards the organisation (Nasir, 2015, p.7). Recognising individuals or teams publicly for their outstanding performance and providing rewards in form of financial incentives, gifts or awards for excellence performance has helped organisations in the successful implementation of quality improvement initiatives. (Crosby, 1984, p.9; Patro, 2013, p.2693). This factor has been labelled Employee Engagement.

Factor 6: consists of seven variables v28, v34, v35, v36, v37, v38 and v39;

V28- Employees are encouraged to accept responsibility for quality

V34- There is a communication system inside the organisation that allows easy communication between top management and employees.

V35- There is effective inter-communication between various levels of the organisation.

V36- The organisation uses information systems to provide high quality data in order to achieve high quality customer services.

V37- There is emphasis on prevention of errors rather than their correction.

V38- Self– assessment tools are used to improve performance gaps in the implementation and effectiveness of system, process and practice.

V39- Benchmarking is used to identify the best procedures for improvement from other organisations with similar interests and goals.

This factor has been labelled Organisational Performance Measurement and Management. According to Oakland (2014, p.120), a good performance measurement framework must involve leadership commitment, employee involvement, planning, sound implementation strategy, measurement and evaluation, control and improvement, achieving and maintaining standards of excellence. Management ensures the involvement of people by assigning

responsibilities to individuals or teams. Stahl (2006, p.53) argued that by giving the responsibility of quality to employees, they are encouraged to act in accordance with set standards and to perform better for the greater good of the organisation. Examples of successful quality performance demonstrate the importance of delegating responsibility of quality to the person doing the job (Messaoud, 2014, p.23). According to Oakland (2014, p.146) "*if all employees participate and own the measurement processes, there will be little resistance and a positive commitment towards future changes*". Involvement of employees ensures the training of staff to prevent errors and to identify potential causes of problems (Crosby, 1984, p.66)

To encourage employees to accept responsibility for quality, managers need to communicate regularly with employees and encourage them to achieve their objectives and personal development plans. Senior management also need to give regular feedback and make use of mentoring skills to support team members to overcome challenges and identify opportunities for learning, development and performance improvement. By using effective communication pathways to provide feedback, reviews take place frequently and are not left to the end of the year when it might be discovered that objectives and development targets have only being partly achieved.

This principle is based on the use of information systems to provide high quality data obtained from audit reports, corrective actions, non- conforming products or customer complaints which are analysed to inform management on the performance of the organisation's product or services. Management can make use of self-assessment tools such as the European Foundation for Quality Management (EFQM) Excellence Model to make decisions and carry out actions on quality issues based on the analyses of data which provide information on the performance levels of current products or services provided by the organisation (Oakland, 2003, p.25)

Factor 7: consists of four variables v40, v41, v42 and v43;

V40- Continuous improvement is applied in all operations.

V41- Continuous improvement is applied at all levels.

V42- A team approach is taken as a main feature to solve problems.

V43- Problem-solving and continuous improvement processes are based on facts and systematic analysis.

This factor has been labelled Continuous improvement as most of the variables connote continuous improvement at all levels, in all operations and processes using facts, systematic analysis and team approaches to solve problems. Customers continuously demand better products and higher quality service delivery; therefore, organisations have to rely on continuous improvement to meet customer demands (Nicolas, 2014, p.117). According to Zarbo (2012, p.322), Deming's (1982, p.23) fourteen management principles form the basis for which management can build a continuous improvement culture within an organisation. Continuous improvements in organisations can happen through gradual improvements or through a radical change (Bhuiyan & Baghel, 2005, p.761)

Table 6.11 below presents a summary of the extracted factors, their labelling after interpretation, the variables that make up the factors as well as their factor loadings on each factor.

Table 6.10: Summary and explanation of QM factors in both case study organisations seen on Table 6.8 (Source: The Author)

Variables	Factors	Factor loading
	F1- Management Commitment	
v1	Senior management have clear vision toward quality, this guides all aspects of running our organisation.	0.980
2	Senior executives are visibly and explicitly committed to quality.	1.009
Q3	Top management allocates adequate resources for quality management efforts.	0.766
Q4	Top management allocates adequate time for quality management efforts.	0.644
Q15	There is strategic quality planning of the long-term quality journey.	0.533
	F2- Organisational Culture Change	**Factor loading**
Q5	Top managers often discuss the importance of quality at general meetings.	0.785
Q6	Top managers support any change required in structure in order to promote the new culture.	0.756
Q7	In my organisation, there is comprehensive identification of customer needs.	0.501

F3- Strategy Deployment		Factor loading
Q16	Mission statements cover the whole organisation.	0.927
Q17	Vision statements cover the whole organisation.	0.834
F4- Employee Training		**Factor loading**
Q18	Training in the total quality concept is given to all employees in the organisation.	0.763
Q19	Employees are trained to improve interactive skills (such as communication skills, effective meeting skills, and leadership skills).	0.901
Q20	Employees are trained in problem identification and problem-solving techniques	1.000
Q21	Seminars and workshops in quality issues are arranged for employees as part of an on-going process.	0.831
Q22	Training and education cover the entire workforce.	0.715
F5- Employee Engagement		**Factor loading**
Q23	The organisation encourages employees to suggest ideas for work improvement	0.809
Q26	The organisation implements employees' suggestions.	0.566
Q31	There is recognition for outstanding performance in the organisation.	0.840
Q32	There is reward for outstanding performance in the organisation.	0.775
F6- Organisational Performance Management		**Factor loading**
v28	Employees are encouraged to accept responsibility for quality	0.552
v34	There is a communication system inside the organisation that allows easy communication between top management and employees.	0.712
v35	There is effective inter-communication between various levels of the organisation.	0.698

v36	The organisation uses information systems to provide high quality data in order to achieve high quality customer services.	0.922
v37	There is emphasis on prevention of errors rather than their correction.	0.800
v38	Self– assessment tools are used to improve performance gaps in the implementation and effectiveness of system, process and practice.	0.667
v39	Benchmarking is used to identify the best procedures for improvement from other organisations with similar interests and goals.	0.853
F7- Continuous improvement		**Factor loading**
Q40	Continuous improvement is applied in all operations.	0.759
Q41	Continuous improvement is applied at all levels.	0.717
Q42	A team approach is taken as a main feature to solve problems.	0.606
Q43	Problem-solving and continuous improvement processes are based on facts and systematic analysis.	0.751

It is pertinent to note that the results of the factor analysis have identified some of the factors which are similar to those identified in each case organisation namely, In SD, Management commitment, Strategy deployment, Employee engagement were identified and in NR, Performance measurement was identified. Three other factors have been identified in addition to these four factors, namely; Employee training, Continuous Improvement and Organisational Culture Change. These results have shown that due to organisational differences, QM implementation factors also differ. The cross-case analysis highlights factors necessary for successful QM implementation for both case Nigerian public sector organisations in the space industry.

These findings are further discussed in section 6.3.2 of this chapter

6.1.5 Cross case analysis of the perceived level of implementation of QM factors in case organisations

This section presents results of statistical analysis which assess the perceived level of QM implementation within both case organisations. Analysis for each case study was done using

factors derived from factor analysis of the combined data from both organisations, to measure the perceived level of QM implementation in each organisation

Table 6.11 below shows the average score of the perceived level of QM implementation in both case organisations

Table 6.11: Perceived level of the CSFs of QM implementation in both case organisations (Source: The Author)

CSFs		Mean scores		Weighted mean scores		Perception Scale	
		SD	NR	SD	NR	SD	NR
Management Commitment	v1	3.17	3.34	2.83	3.05	Medium	Medium
	v2	3.04	3.38				
	v3	2.35	2.76				
	v4	2.64	3.02				
	v15	2.97	2.75				
Organisational Culture Change	v5	3.31	2.96	3.07	3.17	Medium	Medium
	v6	3.09	3.29				
	v7	2.82	3.25				
Strategy Deployment	v16	3.57	3.77	3.55	3.84	High	High
	v17	3.54	3.91				
Employee Training	v18	2.29	2.23	2.58	2.52	Low	Low
	v19	2.63	2.33				
	v20	2.53	2.52				
	v21	2.68	2.46				
	v22	2.81	3.07				
Employee Engagement	v23	3.50	3.66	3.16	2.99	Medium	Medium
	v26	2.68	2.82				
	v31	3.19	2.71				

	v32	3.32	2.79				
Organisational Performance Management	v28	3.28	3.23	2.86	3.29	Medium	Medium
	v34	2.93	3.71				
	v35	3.13	3.18				
	v36	2.72	3.19				
	v37	2.74	3.04				
	v38	2.72	3.32				
	v39	2.60	3.36				
Continuous Improvement	v40	3.23	3.36	3.33	3.54	Medium	Medium
	v41	3.24	3.57				
	v42	3.62	3.61				
	v43	3.28	3.64				
Average score				**3.05**	**3.19**	**Medium**	**Medium**

Descriptive statistics indicate that the overall perceived level of QM implementation for both organisations is within the medium range on the scale. With an overall score of 3.05 for SD and 3.19 for NR. The results indicate that Strategy Deployment is perceived to have a high level of implementation in both organisations, Management Commitment, Organisational Culture Change, Employee Engagement, Organisational Performance Management and Continuous Improvement were all perceived to have medium level of implementation while Employee Training was perceived to have a low level of implementation in both organisations.

It is important to note that the overall mean score which indicates the level of implementation for QM in both organisations is different in value. The average score for SD (3.05) is lower than the average score for NR (3.19). This result might suggest that the implementation of QM in NR is perceived to have made more progress than in SD. These results are further discussed in section 6.3.4 along with results from analysis of interviews with employees

This analysis has provided more insight on how employees in these organisations perceive the implementation of QM based on each critical success factor. It is important for organisations

to know the level they are in their QM implementation journey as this helps direct efforts and resources to areas that need improvement such as employee training in this case.

6.1.6 Results regarding external barriers hindering the implementation of QM

This section provides the combined results of the external barriers affecting the implementation of QM in the both case organisations in this study. The respondents' views are measured as discussed in section 4.1.7. Table 6.13 presents the combined average scores from both organisations. The barriers are ranked in the descending order according to the extent to which they hinder the implementation of QM.

Table 6.12: External Barriers to QM implementation in SD an NR (Source: The Author)

Barriers	Average scores		Rank	
	SD	NR	SD	NR
Inadequate facilities	4.42	4.30	1	1
Inadequate infrastructure	4.33	4.07	2	3
Abandonment of projects due to lack of funds.	4.26	4.13	3	2
Lack of availability of modern technology.	4.22	3.92	4	7
Delays in the completion of projects	4.16	4.04	5	4
Slow process of decision making	3.82	4.02	6	5
Lack of information flow from top management	3.71	3.77	7	8
Changes in projects already embarked	3.62	3.71	8	9
Lack of innovation and creativity within the system	3.52	4.00	9	6

The results of this analysis show that the least barrier in SD has an average score of 3.52 while that of NR is 3.71. This indicates that all these barriers are perceived to affect the implementation of quality initiatives to a certain degree in both organisations. More so, the ranking of the barriers based on the average scores is quite similar for both organisations, as the first three major external barriers to QM implementation are the same but ranked slightly differently. Inadequate facilities ranked first as the major barrier in both organisations, inadequate infrastructure and abandonment of projects due to lack of funds are also perceived to be major external barriers preventing the implementation of QM initiatives across both organisations.

Differences between ranking of the external barriers in SD and NR is spotted among the barriers perceived to be having the least impact in hindering QM implementation in both organisations. While lack of innovation and creativity within the system is perceived to be the least external barrier to QM implementation in SD, it is perceived to be having more impact as a barrier to QM implementation in NR as it is ranked 6th among the 9 barriers hindering QM implementation. Changes in projects already embarked upon is rather perceived to be the least external barrier to QM implementation in NR.

The similarity in the ranking of the three major barriers indicates that these barriers are affecting both organisations in a similar way. This is important knowledge for organisations within this sector that are in the process of implementing QM initiatives to be aware of the barriers which they will encounter in their journey. Identifying barriers to QM implementation and ranking them from major barrier to least barrier is important also for senior management of these organisations and policy makers to easily identify the top most critical barriers and the least critical barriers and understand areas to commit public resources to in order to support public sector organisations in their quality improvements efforts (Jacobson, 2008, p.8). These findings are further discussed in section 6.3.3

6.1.7 Results regarding internal barriers to QM implementation

This section ranks the internal barriers to QM implementation as perceived by employees in both organisations. The barriers are ranked in descending order according to the extent to which they hinder the implementation of QM. Table 6.15 presents the results.

Table 6.13: Internal Barriers to QM implementation in SD and NR (Source: The Author)

Barriers	Average scores		Rank	
	SD	NR	SD	NR
Lack of training programs relating to the quality management system.	4.28	4.41	1	2
Lack of top management commitment to QM implementation	4.23	4.37	2	3
Lack of use of quality measurement and benchmarking.	4.19	4.14	3	6
Lack of effective measurement of quality improvement	4.17	3.64	4	10
Lack of focus on customer satisfaction	4.09	3.73	5	9
Ineffective communication between the organisation and its customers	4.07	4.05	6	7
Poor organisational communication	3.99	3.83	7	8
Lack of commitment to quality strategy requirements.	3.96	4.21	8	5
Lack of a recognition system	3.66	4.57	9	1
Lack of a reward system.	3.64	4.30	10	4
Resistance from employees	3.50	3.53	11	11

There are noticeable differences in the ranking of these barriers as perceived by employees of both organisations. The first four major internal barriers perceived to be preventing implementation of QM in SD are; lack of training programs relating to the quality management system, lack of top management commitment to QM implementation, lack of use of quality measurement and benchmarking and lack of effective measurement of quality improvement. These barriers can be condensed into three groups identified in literature namely; lack of training, lack of management commitment and lack of performance measurement for quality improvement (Crosby, p.5; Sebastianelli, & Tamimi, 2003, p.52).

On the other hand, the four major internal barriers perceived to be preventing the implementation of QM in NR are; lack of a recognition system, lack of training programs relating to the quality management system, lack of top management commitment to QM implementation and lack of a reward system. These barriers can be grouped into two groups of barriers found in literature namely; lack of employee involvement (engagement) and lack of management commitment (Mosadeghrad, 2014, p.163).

This result indicates that the major issue for employees in SD is the lack of management's commitment to providing training programs for employees and setting up an efficient measurement system for quality improvement while the results from NR indicates that the major issue for employees is a lack of management's commitment to engage employees by motivation through a recognition and rewards system and a lack of management's commitment to provide training programmes for employees. The issue of lack of training is highlighted here again as it scored low in the level of implementation as discussed in section 6.1.5.

This analysis highlights the difference in how the same set of barriers can affect different organisations in different ways due to their organisational structure or objectives. In SD, the absence of training programs relating to the quality management system is perceived to be a major obstacle to the implementation of QM while the absence of a recognition and reward system in NR is perceived to be a major obstacle to the implementation of QM.

The result is important for top management within this sector to understand and prioritise the barriers according to the criticality (Talib & Rahman, 2014, p.613) There are many times when due to insufficient funds, it becomes impossible for the management to deal with all the barriers at the same time and this may cause some difficulty in pursuing a QM programme in the organisation (Gijo & Tummala, 2005, p.724). However, by prioritising of the barriers, the management will know which barriers they have to pay attention to first in order to get positive results from their QM programme. Therefore, both case organisations within this study, knowing these critical barriers will be beneficial for them.

Summary

Data analysis and findings of the data collected using questionnaires has been presented in this section. Major factors of QM implementation were identified through factor analysis. Based on the results of the factor analysis, tests of construct validity, and reliability assessment, as described above, a reliable, tested, and validated instrument has been developed to identify seven success factors of quality management implementation for both case organisations. Cross case analysis was also carried out to compare the level of implementation of the identified QM factors in both organisations. Strategic Policy Deployment was perceived to have a high level of implementation in both organisations while Employee Training was perceived to have low level of implementation. The level of QM implementation in both organisations was perceived to be medium.

Further analysis to determine the barriers to QM implementation indicated that inadequate facilities is perceived to be the biggest external barrier to QM implementation in both organisations. Lack of innovation and creativity within the system was perceived to be the least external barrier in SD while changes in projects already embarked upon was perceived to be the least external barrier in NR

Also, lack of training programmes relating to the quality management was perceived to be a major internal barrier to QM implementation in both organisations. This barrier ranked first as the biggest barrier in SD and ranked second in NR. Lack of a recognition system ranked first as the biggest barrier to QM implementation in NR.

The next section presents qualitative analysis of interviews with participants from both organisations' analysis and discussion of the findings from the interviews.

6.2. Qualitative analysis of interviews

This section presents findings from the qualitative data collected using interviews with staff of SD and NR. The protocol used for template analysis in section 4.2.3 and 5.2.3 was also used as a guide in conducting this analysis. The interviews focused on exploring the understanding of quality and quality management (QM) among staff of both organisations and explored the perceived key enablers as well as barriers to the implementation of QM initiatives in SD and NR. The discussions centred on themes which included job roles, reason for QM implementation, improvement initiatives implemented, enablers of the implementation and obstacles to implementation of improvement initiatives in SD and NR.

6.2.2 Characteristics of participants in the interviews in SD and NR

Semi-structured interviews were conducted with seven employees in SD and NR. The details of participants and their identifiers are presented in Table 6.16

Table 6.16: Interview participants and their identifiers in both case organisations. (Source: The Author)

Name	Job level	Identifier	Organisation
Participant 1	Senior manager	HOU	SD
Participant 2	Middle manager	ASC	SD
Participant 3	Lower manager	POF	SD
Participant 4	Lower manager	SOF	SD
Participant 5	Non-manager	TOF	SD
Participant 6	Middle manager	CEN	NR
Participant 7	Lower manager	PEN	NR

6.2.3 Cross case analysis of interview themes

The protocol discussed in section 4.13 was used to develop themes from the interview transcripts. These themes are further discussed in section 6.3, together with results from the quantitative analysis of the questionnaires. The themes drawn from the interviews are described below;

6.2.3.1 Organisation type

From the responses, both organisations are government-owned and are involved in the provision of a range of satellite products and services to other Nigerian government organisations, the Nigerian citizens and organisations from other countries. They are also involved in the design of satellite subsystems and monitoring of the Nigerian satellite in space from the ground station. It was important to explore this theme was in order to establish that these organisations are both Nigerian PSOs in the space industry as is the objective of this study.

6.2.3.2 Job role

The second theme that arose from the interviews was the job roles. Details of their job roles have been discussed in sections 4.2.1 and 5.2.1

The job roles as explained by the participants gave the researcher an understanding of the work done by both organisations and the role each employee plays in implementing QM within their organisations.

6.2.3.3 Quality concept

The general understanding of the concepts of quality and QM is another theme drawn from the interviews. Ferreira and Diniz (2004, p.2) maintain that the implementation of QM starts with fully understanding its meaning. This theme provides an insight to the aspect of QM that resonates in the organisations. Details of this theme have been discussed in sections 4.2.1 and 5.2.1

According to the answers from four participants in SD, the quality concept is based on adherence to set standards while one participant related quality to achieving best results at a minimum cost. In NR, both responses about the understanding of the quality concept referred to meeting customer needs and satisfying the customer. The responses of participants give an indication to the definition of quality by organisations in the Nigerian space industry. This theme is further discussed in section 6.3.2 with results from the quantitative analysis of the questionnaires.

6.2.3.4 Reasons for QM implementation

These reasons have been discussed in more detail in sections 4.2.3.4 and 5.2.3.4. A summary of these reasons stated for the implementation of QM is given below;

In SD, POF stated that it is mandated by the Nigerian government to implement quality initiatives for continuous quality service delivery. ASC stated that quality initiatives are being implemented to improve inefficient processes within the organisation. SOF stated that quality is being improved to meet with high quality standards set up within the space and satellite industry. While in NR, CEN stated that quality is being implemented to be in line with global management practices, to be able to assess and evaluate its products using benchmarking and to stay ahead of competitors within the space industry. PEN was of the opinion that quality improvement initiatives are been implemented to improve the organisation's product and services, to retain customers by identifying their needs and satisfying them and to grow the organisation's customer base

The responses by participants in SD indicate that the organisation is implementing QM initiatives to improve processes in the organisation and improve quality of products while the responses from participants in NR indicate that it is implementing QM initiatives to improve the quality of its services and products to satisfy its customers. The responses also indicate that the Nigerian government is making use of QM initiatives to reform its public sector just like other countries such as states within the United Arab Emirates (Mansour & Jakka, 2013, p.99),

Northern Ireland (Hazlett & Hill, 2000, p.515) and Turkey (Sadikoglu and Olcay, 2014, p. 9). These reasons for implementing quality improvement initiatives in both organisations are consistent with literature (Talib & Rahman, 2010, p.263).

6.2.3.5 Ways quality management has been implemented

Under this theme, participants identified how quality initiatives are being implemented in the organisation to bring about improvement. Details of these have been discussed in sections 4.2.1 and 5.2.1. A summary of what employees perceive are ways QM is being implemented are given below;

In SD, the following initiatives were mentioned; HOU mention setting of performance standards for employees, units and departments, and ASC mentioned, carrying out internal and external audits and creating an organogram with clearly defined job roles and responsibilities for all staff in the organisation, quarterly evaluation of performance of all units and departments; POF and SOF mentioned monitoring adherence to set standards for projects.

In NR, CEN mentioned carrying out customer surveys to measure customer satisfaction and to know customer needs, having a customer relations unit and continuous monitoring of the system on an hourly, daily and weekly basis to measure performance of the system. PEN mentioned delegating a level of authority to employees on different management levels to handle issues that come up within the organisation and having effective inter-communication between management levels. PEN also stated that a committee has been set up in the organisation to strategize on quality improvement issues.

The responses from participants in SD indicates that quality improvement practices in SD involve aspects of quality control and assurance where products and services undergo various tests and evaluation to ensure they conform to specific standards while the responses from participants indicates that NR might be at a more advanced stage of QM implementation where key aspects of QM including customer needs are integrated into business processes (Al-Qahtani, Alshehri & Abd.Aziz, 2015, p.123; Abdullah, 2010, p.13).

These practices are consistent with QM practices mentioned in literature. Crosby (1984, p.108), in his 14 steps of quality steps of quality improvement, acknowledges measurement of performance as an important step in the implementation process of QM. Oakland (1993, p.33) postulates that to make QM effective, there must be a of review of the organisation's structure to include clearly defined job responsibilities and operational procedures.

6.2.3.6 Enablers of quality management implementation

The sixth theme drawn from the interviews was the enablers of quality management implementation within the organisation. Details of these enablers have been discussed in sections 4.2.3.6 and 5.2.3.6. A summary of enablers identified by both organisations are stated below;

In NR, PEN recognised that there is free flow of information throughout the organisation keeping everyone in the organisation informed and involved; monthly team meetings are also held where quality issues are discussed. CEN stated that there is an effective communication system between management levels and employees are encouraged to make improvement suggestions which are acted upon. In SD, HOU and mentioned the setting up a QM unit which is responsible for carrying out quality control and assurance on projects and processes in the organisation and ASC mentioned the willingness of employees to participate in implementing changes.

The responses from participants in SD indicate that quality management is mostly centred on one department in the organisation who is tasked with the responsibility of ensuring that products and processes adhere to set quality standards whilst in NR, the responses indicate that quality is the responsibility of every member of the organisation and that therefore everyone is involved in the process of implementing quality improvement initiatives.

These enablers mentioned by participants are consistent with those found in literature. For the implementation of QM to be successful, there should be free flow of information, employee involvement and an effective communication (Talib & Rahman, 2010, p.261)

6.2.3.7 Barriers (external obstacles) preventing QM implementation

The seventh theme from the interview was external barriers which serve as obstacles to implementing quality initiatives and are out of the control of the organisation. Public sector organisations face enormous external pressures, most of which affect the implementation of quality initiatives (Kosgie, 2014, p.13). This theme provides insight to the nature of external pressures which are acting as barriers to the implementation of QM in these organisations. Details of these barriers have been discussed in sections 4.2.3.7 and 5.2.3.7. A summary of the barriers mentioned are given here;

In NR, CEN stated that bad government policies such as placing an embargo on recruitment of staff and on staff trainings done outside of Nigeria, were affecting quality improvement efforts in NR as well as the late passing of the national budget which was affecting the completion of

projects already embarked on. PEN stated that inadequate funds from the government's budgetary allocation have caused a lack of the necessary equipment (hardware and software) to carry out projects. Also, inadequate infrastructure such as inadequate power supply due to the inconsistent power generation in the country was affecting quality improvement efforts because funds needed for other projects were often times, diverted to provision of power in the organisation. In SD, the late passing of the national budget, inadequate funds, and inadequate infrastructure were also stated to be barriers hindering the quality improvement efforts in SD.

The responses from participants indicates that both organisations are facing the same external barriers. These barriers are consistent with barriers facing other PSO's in Nigeria such as the (Emeje et.al, 2019; Babatunde & Victor, 2018, p. 185). These external barriers are also consistent with barriers identified by studies carried out in other countries such as the study by Kosgie (2014, p.15).

6.2.3.8 Barriers (internal obstacles) to quality management implementation

Internal barriers hindering the implementation of quality initiatives was another theme drawn from the interviews. Research shows that by understanding factors that impede the implementation of QM, managers can plan and develop effective strategies to overcome such barriers (Cătălin, Bogdan and Dimitrie, 2014, p.1237). Details of these barriers have been discussed in sections 4.2.3.8 and 5.2.3.8. A summary of the barriers mentioned by participants from both organisations are stated below;

In SD, POF mentioned the lack of training of employees in quality related issues. SOF stated that there is a lack of commitment by the senior management to ensure the proper implementation of quality improvement initiatives in the organisation. Examples cited were a lack of communication from senior management on quality issues and mismanagement of funds as funds allocated for carrying out some projects were not spent on those projects. ASC stated that there is favouritism in assigning individuals to projects and trainings, instead of assigning competent staff to project teams, senior management were said to place staff who they favoured in such projects. ASC also mentioned bureaucratic obstacles in organisational processes, giving staff responsibility without authority, having an evaluation process in place which has not been validated, not having feedback system in place and not focusing on all the objectives of the organisation, concentrating too much on a few objectives and abandoning the rest. In NR, CEN stated that a lack of training was affecting quality improvement efforts and

PEN stated that there was some resistance from some managers who feel threatened by lower level staff.

The responses from participants in SD indicate that the internal barriers are mostly as a result of a lack of management commitment and leadership. Senior management are not committed and therefore employees are not trained in quality issues and therefore cannot take ownership of quality implementation, also favouritism, bureaucratic obstacles and a lack of a validated evaluation processes are indications that the leadership of the organisation are not committed to improving quality in SD. Responses from participants in NR also indicates a lack of management commitment and leadership. According to Deming (1986, p.60) it is the job of a good manager to drive out fear in the organisation. Fear in this organisation takes different forms, fear from senior management to allocate scarce resources to training of employees and not getting results and fear from some managers who feel their authority will be undermined when lower level employees are delegated responsibilities with a level of authority.

All these barriers mentioned by participants in this study, will continue to hinder the implementation of QM if they are not eliminated from both organisations.

6.2.3.9 Benefits of QM implementation

The perceived benefits from implementing quality management was another theme from the interviews. These benefits have been discussed in detail in sections 4.2.3.9 and 5.2.3.9. A summary of the benefits is given below;

In NR, PEN stated that stated that staff are more motivated to carry out their jobs. CEN mentioned that there has been an increase in customer confidence in the organisation's products and services resulting in the award of more contracts and a growth in the customer base. While in SD, ASC stated that waste had been reduced by the elimination of duplicated responsibilities; the process for staff development had become more efficient and there is also improvement in the definition of responsibilities for each member of staff in the organisation.

These responses indicate that employees in both organisations have started witnessing the benefits of implementing QM initiatives. Employees are aware of the desired outputs from implementation of quality improvement initiatives in these organisations. It is pertinent to note that the benefits mentioned are in line with the reasons stated for the implementation of QM initiatives as discussed in section 6.2.3.4. These benefits have also been found in literature by Ab-Rahman et.al, (2011, p.620) and Polat et.al, (2011, p.1118).

6.2.3.10 Employees' suggestions on possible improvements

This theme draws on the suggestions from the participants on possible improvements that can be done not just for their organisations but for the Nigerian space industry. A summary of improvement suggestions is given below;

In NR, CEN suggested that government policies should be implemented after much consultation and public sector organisations in industries such as the space industry should be taken into consideration with regards to technological needs of organisations in the industry.

In SD, ASC suggested the setting of targets for individuals, units and departments with clearly defined output which can be measured. HOU suggested that top management should have a clear vision of what they want to achieve within their tenure in office. Such a vision should encompass all the objectives of the organisation and be easy to communicate to every member of the organisation. SOF also suggested the continuous training of staff in quality related issues. These suggestions apply to both organisations and other public sector organisations as well.

The next section presents a summary of the themes discussed in this part of chapter 6.

6.2.4 Interview Analysis Summary

The interviews with the employees across both case organisations discussed the job role of the employees, their understanding of the quality concept and the reason for the implementation of quality improvement initiatives within their organisation. The interviewees also described the key enablers and benefits of improvement efforts, barriers to improvement efforts and suggested improvement possibilities that can be done in both organisations. The analysis of the interviews pointed to the understanding of the quality concept in both organisations. Definitions of the quality concept and QM differed in both organisations. Participants in SD's definitions were in line with adherence to product quality standards while employees in NR's definitions were in line with the identification of customer needs and satisfying those needs. More so, in terms of the enablers of QM implementation, the participants identified the following; top management commitment, communication, willingness of employees to participate. These enablers from the thematic analysis of the interviews are consistent with those QM factors identified by factor analysis of the questionnaires and those found in literature (Kundu & Manohar, 2012, p.660).

Furthermore, the participants described several issues that hinder the implementation of quality initiatives in the organisation which include lack of commitment by top management to QM

implementation, the influence of government policies on improvement efforts in the organisation, bureaucracy, favouritism and a lack of training in the quality management concept. Yearly budgetary cuts of the organisation's budget were reported to be the cause for the lack of sufficient resources to carry out quality management implementation.

Furthermore, the interviewees offered suggestions for ways in which quality management can be implemented within organisations. The suggestions included continuous training of all staff in quality related issues, because according to the interviewee, only members of the quality management unit received training in quality related issues leaving other members of staff with little knowledge of quality management. Another suggestion for the improvement was the setting of clearly defined targets and objectives for the implementation of QM.

The next section of this chapter discusses the findings of the questionnaire and the data obtained from the interviews to support the questionnaire results.

6.3: Discussion of quantitative and qualitative analysis

This section discusses the results that emerged from both the quantitative and qualitative analysis of the questionnaires and interviews. The section provides a discussion of the research findings and links them to the relevant literature in order to realise the research objectives.

6.3.1 First objective: to determine definition of quality and determine the QM technique implemented by each case organisations for quality improvement.

The results of the analysis of the quantitative data indicated that the most used quality improvement technique in both organisations is quality control/assurance. (section 6.1.3) Although most employees in NR were not aware of the quality improvement initiative being implemented in their organisation (see section 5.1.3) compared to SD where a larger number of the employees showed an awareness (see section 4.1.3). This could be as a result of presence of a quality management unit in SD with employees who according to PSO, are tasked with the responsibility of carrying out checks on products and processes. There was no quality management unit in NR, however there was a customer relations unit which according to PRE, serves as a link between the organisation and external customers and also coordinates activities within the NR to satisfy customer needs.

In SD, PSO discussed the use of quality checks by staff in the quality management unit to ensure compliance to quality standards. In NR, CEN discussed the use of quality control for monitoring purposes. Systems are continuously monitored to identify and resolve any abnormalities so as not to disrupt services provided to customer.

From analysis of the interviews in sections 4.2.3.3 and 5.2.3.3, the definitions of the quality concept were different in both organisations. For SD, the definition of concept of quality and QM resonates a focus on product quality. Therefore, the definitions by participants were more in line with meeting product standards and adhering to required quality requirements. However, the definition of the concept of quality and QM in NR resonates a focus on the customer and user satisfaction. Definitions were all in line with identification of customer needs and customer satisfaction. The element of quality control seemed to be more pronounced in SD than in NR. In SD, there seemed to be a lot of focus on meeting product and process standards while in NR there seemed to be a lot of focus on customer service. Ferreira and Diniz (2004, p.2) postulates that the concept of QM revolves around the interaction between three variables; product, customer and use. The dynamics of the interaction between these variables reflects in an organisation's working policies. For SD, the definition of concept of quality and QM seems to resonate a focus on product quality. Therefore, the definitions by participants were more in line with meeting product standards and adhering to required quality requirements. However, the definition of the concept of quality and QM in NR seems to resonate a focus on the customer and user satisfaction as definitions were all in line with identification of customer needs and customer satisfaction. The dynamics in the use of the quality control approach for quality improvement might be due to function and objectives of each organisation. As a result of which quality control has been adapted to suit the working policies of the organisation as found in literature (Stringham, 2004, p.185; Mansour & Jakka, 2013, p. 101) which encourages that QM approach be tailored to their individual circumstance.

From the cross-case analysis SD and NR seem to have adopted Quality control/Assurance technique to improve quality of products and services. This approach has been tailored to suit the working policies and operations of each organisation.

Furthermore, the definition of quality from both quantitative and qualitative analysis in both organisations aligns with the definition given by Goetsch & Davies (2013, p.4) which defines quality as *'a dynamic state associated with products, services, people and processes that meets or exceeds expectations and helps produce superior value'.*

6.3.2 Second objective: to determine the CSFs and the level of implementation based on the perception of employees.

The analysis of questionnaires and interviews identified seven QM factors across both organisations; Management Commitment and Leadership, Organisational Culture Change, Policy Deployment, Employee Training, Employee engagement, Organisational Performance management and Continuous Improvement. All seven factors are consistent with literature as discussed below;

6.3.2.1 Management Commitment- This factor has been identified as the most essential element of QM implementation in public sector organisations (Fryer, Anthony & Douglas, 2007, p.503; Fernandez & Ratney, 2006, p.171; Krishnan, 2016, p.249). This factor demands that senior managers, not only support but participate through their actions and not just control staff but encourage them to focus on achieving quality objectives (Deming, 1986, p.21; Ugboro & Obeng, 2000, p.255).

From the quantitative analysis, this factor was perceived to have a medium level of implementation in both organisations although the average score for NR was higher at 3.04 than SD with a score 2.80. Lack of top management commitment to QM implementation was also indicated to be the second biggest internal barrier to QM implementation in SD. Responses from interviews with employees from SD further stressed the point that of lack of management commitment to QM implementation with ASC stating that "*managers are only paying lip service to the issue of quality management. There is no clear vision from management*". SOF also stated that "*senior management always talk about quality improvement at general meetings but after the meetings, that is the last I hear about it*"

However, qualitative analysis of interviews from NR indicated that management commitment is an enabler for the implementation of QM. PEN stated that "*senior management is very open about the issue of quality management. There is free flow of information concerning performance as an organisation. The managing director holds quarterly meetings with all member of staff to discuss. A review of the last quarter is done and a new strategic plan is communicated to us for the new quarter. These meetings are also used as an avenue to discuss staff challenges and management proffers solutions where they can.*"

Results of quantitative and qualitative analysis have all indicated that management commitment factor is perceived differently in the two case organisations. For SD, both analysis of quantitative and qualitative data indicated that this factor is perceived to be at a medium

level in the organisation. In NR, there is a mixed opinion about this factor, quantitative analysis indicated that this factor is perceived to be at a medium level, while the qualitative data identified this factor as an enabler of QM implementation in the organisation. The opinions from the NR could be mixed due to the nature of questions asked in the questionnaire. Management might be showing strong commitment in some areas of QM implementation but lack commitment in other areas in NR.

6.3.2.2 Organisational Culture Change- Organisational culture is often a replication of national culture. It could also be a result of ways of working in different industry sectors (Al-Ibrahim, 2014, p.132). However, by implementing QM initiatives, change is inevitably brought into organisations (Sandström & Svanberg, 2011, p.21). There are different factors that trigger change in organisations. According to Lewis (2011, p. 690) there are internal and external factors that constantly change and require organisations to adapt and innovate. Participants gave reasons for change in their organisations such as improvement in processes, products and services, to be ahead of their competitors, to improve efficiency within the system. This QM implementation factor was perceived to have medium impact in both organisations.

Organisational culture change requires effective leadership to plan, organise, monitor and control the change process as change efforts in organisations often fail due to poor management. Poor management includes lack of vision, lack of communication, not having a long-term plan and lack of resources (Sandström & Svanberg, 2011, p.22). From Quantitative analysis, the organisational culture in both organisations was perceived to be at a medium level. However, the level of implementation in NR was perceived to be higher than the level of implementation in SD. In SD, it was perceived that senior management were not doing enough to change the culture in the organisation to support QM implementation as ASC states "*Senior management should have a clear vision of what they want to achieve within their tenure in office. Such a vision should encompass all the objectives of the organisation and be easy to communicate to every member of the organisation*"

Participants in NR were of the opinion that the organisational culture had changed to support the implementation of QM. CEN stated that "*management decisions are communicated to all members of staff and when we have challenges, we can easily communicate these challenges to our seniors*"

Quantitative and qualitative analysis indicated that the organisational culture in NR has changed and is working as an enabler to the implementation of quality however, this does not seem to be the case in SD.

6.3.2.3 Strategy Deployment- Quantitative analysis revealed that this factor scored high as perceived by employees across both organisations. Interview analysis indicated that there is awareness of the mission and vision statement and the quality policies in these organisations. Strategic policies have been developed and deployed by senior management and have been adapted into the organisation's systems. However, some participants in the interview such as ASD from SD were of the opinion that these policies were not well planned as they had no defined output and no clear long-term vision towards achieving successful QM implementation in SD (see section 4.2.3.8). PEN from NR also stated that resistance from some managers was affecting deployment of strategies in the organisation (see section 5.2.3.8). A clearly defined vision from the senior management will ensure that there is a good understanding of what must be done so that the desired outcomes are achieved (Shehu & Akintoye, 2019, p.5) and having weak mission and vision quality statements may lead to a failure in implementing QM.

The results of the analysis indicate that employees in both organisations are aware of the strategic plans from senior management and that is why this factor has scored high however, there are issues in deployment of policies in both organisations. In SD, policies are not properly planned and have no clear long-term vision while in NR, there is resistance from some managers.

6.3.2.4 Employee Training- Employees have been recognised as the building blocks for the successful implementation of QM and that is why they must be continuously trained to increase their capacity to do their jobs and develop skills for finding out and solving problems which will in turn improve quality (Azeem, Rubina & Paracha, 2013, p.696; Talib & Rahman, 2015, p.594) Organisations are advised to include employee training in their strategic plan and adequate budget allocation be made towards staff training to ensure successful QM implementation (Patro, 2013, p.2690) . Studies by Zakuan, Muniandy, Saman, Ariff, Sulaiman and Jalil (2012, p.28), Bigliardi and Galati (2014, p.167) and Bouranta, Suárez-Barraza and Jaca (2019, p.13) all identified employee training as an important factor to implementing quality in service sector organisations.

Quantitative analysis of the questionnaire indicated a low score for employee training in both organisations. Also, lack of training programmes relating to the quality management was also identified to be the one of biggest internal barriers to QM implementation for both organisations. Analysis of qualitative data supported these results from the questionnaire. In SD, POF stated that "*there is a lack of training for employees to handle quality related issues*" While in NR, CEN explains that the barrier of lack of training is made worse by an external barrier from a government policy which has prevented staff in the civil service from obtaining training outside the shores of Nigeria. Public sector organisations were mandated to undertake all staff training in Nigeria (pmnewsnigeria.com, 2015)

The findings from quantitative and qualitative analysis indicate that this factor has scored low in both organisations because it is affected by both internal and external factors. Internal factors such as the lack of in-house trainings for employees and the external factor is the policy by government preventing employees from getting trainings outside Nigeria. Trainings in satellite space systems which cannot be provided in Nigeria.

6.3.2.5 Employee Involvement- employee involvement involves empowering employees to partake in decision making and improvement activities suitable to their levels in the organisation (Zakuan, Muniandy, Saman, Ariff, Sulaiman & Jalil, 2012, p.26)

Eskildsen and Dahlgaard (2000, p.1082) maintain that if there is an absence of inputs from employees, both physically and emotionally, the fundamental aim of any quality initiative will probably not be met. Patro (2013, p.2690) posits that employee involvement can be increased through the introduction of various incentives in organisations such as suggestion schemes and rewards and recognition scheme. Rewards and recognition are reinforcements to let employees know that they are valuable members of the organisation. Attempts should therefore be made to encourage employees to recognise that the job they are doing is worth the effort and is a contribution to the achievement of QM implementation (Talib & Rahman 2010, p.260; Patro, 2013, p.2690)

Results of qualitative analysis indicates that this factor had a medium impact across both organisations. However, the factor scored higher in NR than in SD from quantitative analysis. Qualitative analysis of the interviews highlighted the difference in implementation of this factor in both organisations. Employees in NR explained that they are encouraged to make suggestions on quality improvement which is not the case in SD. PEN from NR explains "*any staff can come up with ideas on what they have discovered in the process of carrying out their*

job responsibilities and send it to the senior management who looks into it and arranges a meeting with the member of staff to discuss them further"

The devolution of organisational autonomy to lower managerial levels in NR seems to have produced middle and lower managers who are more committed, empowered, and high levels of motivation than is been witnessed in SD.

6.3.2.6 Organisational Performance management and measurement - from the questionnaire analysis, this factor was perceived to have a medium level of implementation in both organisations. In NR, senior and middle management employees perceived this factor to be moderately implemented while lower and non-management employees perceived this factor to be highly implemented. CEN stated that their services and processes were benchmarked with global best practices. Performance evaluations of employees are also carried out annually and areas of improvement communicated to staff. Performance management helps organisations achieve their goals by monitoring and improving the performance of individuals, departments and units within organisations. Performance management is important in public sector organisations to provide accountability for public funds spent and more effective public services (Rouse, 1999, p.76). According to the interviewees, NR is implementing this QM factor by carrying out performance appraisals, setting key performance indexes for units and departments and benchmarking against world best practices. Analysis of the questionnaires also revealed that there are clear communication pathways within the organisation to allow free flow of information and feedback between management levels.

According to Patro, (2013, p.2690) organisations should continuously collect and analyse data in order to know how the organisation is performing. Insights from data analysis should also be considered when making decisions for the future.

An effective information system within an organisation ensures wider communication and provision of frequent feedback to staff to assess their performance (Talib & Rahman, 2010, p.374).

6.3.2.7 Continuous Improvement- The purpose of continuous improvement within organisations is to achieve levels of performance that are higher than current levels so the organisation can sustainably develop. Continuous improvement requires that the processes must be continually reviewed and improved (Talib & Rahman, 2010, p.259). It could be small incremental changes or radical changes targeting the elimination of waste in all systems and processes of an organisation (Singh & Singh, 2015, p.76)

Continuous evaluation of performance was mentioned as a way in which the organisations were practicing continuous improvement of their processes and systems. This factor was also perceived to have medium impact in both organisations.

6.3.3 Third objective: determine the barriers to success factors of QM implementation in SD and NR.

QM has been suggested in principle to be effective for improving performance, but its implementation is not without difficulties and achieving its promised benefits is not easy. Organisations usually experience barriers in implementing quality improvement initiatives (Mosadeghrad 2014, p.320)

Analysis of the questionnaire showed that external barriers such as inadequate facilities, abandonment of projects due to lack of funds and inadequate infrastructure were the biggest external barriers facing the implementation of quality improvement in both organisations. However, their ranking was slightly different in each organisation as indicated in section 6.1.6. Analysis of the interviews in SD and NR supports this result as participants revealed that the lack of facilities is as a result of inadequate funding from the government budgetary allocation. In NR, CEN was of the opinion that projects were abandoned because they could not be funded from the low funds allocated to the organisation from the government budget. CEN stated that funds allocated for projects were most times diverted to other things such as generating power supply so as not to disrupt services provided to customers. While in SD, SOF presented another angle to this problem where she stated that there was lack of funds for the organisation (SD) due to mismanagement of funds by top management. Comparing the quantitative and qualitative findings has shown that both organisations are facing similar external barriers to QM implementation, but interviews have revealed the differences in how these barriers are experienced in each organisation.

The issue of lack of funds by public sector organisations that do not have direct financial control has also been identified by Sajjad & Syed in their study of the implementation of TQM in public sector organisations in Pakistan.

Suleman & Gul, (2015, p.130) agree that resources always play a major role in implementation of QM practices in public organisations. Without adequate resources and funding, the organisations will face problems. The results of this study indicate that insufficient funding and resources was a main barrier to effective implementation of QM in the Nigerian public sector organisations used in this case study.

6.3.4 Fourth objective: determine the internal barriers to success factors of QM implementation in SD and NR.

Analysis of the questionnaire also showed that in SD the perceived major internal barriers preventing implementation of QM in SD are; lack of training programs relating to the quality management system, lack of top management commitment to QM implementation and lack of use of quality measurement and benchmarking while the perceived internal barriers to QM implementation in NR are; lack of a recognition system, lack of training programs relating to the quality management system and lack of top management commitment to QM implementation. The results indicate that in lack of training and lack of top management are major issues in both organisations. This point was reiterated in the interviews ASC ascribed the lack of top management commitment to favouritism and bureaucracy. He explained that favouritism was often displayed where "*certain employees who are favoured by senior management are assigned to projects instead of assigning employees who had the skills and competence needed within the project area*". This type of practice can have a negative effect on the motivation of the workforce (Al-Ibrahim, 2014, p.131). Bureaucracy was also mentioned by ASC in SD where the organisation has various layers of management to authorise processes and projects resulting in slow decision making. Patro (2013, p.2690) posits that bureaucracy can make the employees of an organisation leave the quality implementation to management. Things often described as "red tape" include filling out paperwork, obtaining licenses, having multiple people or committees approve a decision and various low-level rules that make conducting one's affairs slower, more difficult, or both. These affect QM implementation by delaying the process of implementation also can lead to demotivation of employees in the implementation process of QM. While in NR, CEN stated that training was not an on-going process for the staff causing a lack of technical knowledge of quality management. Fernandez and Rainey (2006, p.172) advised that in order to implement QM initiatives successfully, management should focus on providing the necessary resources for training of the organisation's employees to perform their jobs accurately and to a high-performance level.

Fernandez and Rainey (2006, p.172) also note that a lack of support from management, may sometimes be from a lack of understanding among management of the QM philosophy. QM implementation factors may be perceived subjectively by different managers, thereby preventing the successful implementation of QM initiatives. To prevent this, it is important that agents of change focus on educating managers at all levels on the importance of the QM implementation process.

There is an observed difference where lack of quality measurement and benchmarking is perceived as one of the major barriers in SD which is not the case in NR. Instead, lack of a recognition system is perceived to be a major barrier in NR. Although both were perceived as barriers in both organisations, the level of impact was perceived differently. In SD, ASC stated that the measurement system in place was not a validated one and this may be why it is perceived as lacking in the organisation. Factor analysis identified employee focus as a critical success factor in NR while descriptive analysis indicated that the perceived level of implementation of this factor is low. This could be the reason why recognition of employees to be lacking in NR and has come up to be a major internal barrier in NR. Management in NR have to introduce a recognition system which recognises the contributions of employees to QM implementation in the organisation. Ali & Ahmed, (2009, p.271) emphasis that recognition of employees is a powerful trigger for employee accomplishment and fulfilment.

Findings in this study highlights how the same set of barriers can affect different organisations in different ways due to their organisational structure or objectives.

The next section presents a proposed model for QM implementation in Nigerian PSO's in the space industry, based on the findings from this study.

6.4 Proposed model for QM implementation

The proposed model has been developed as a consequence of the research findings, which were obtained through quantitative and qualitative methods providing an assessment of various factors relating to QM implementation and an investigation of related literature. This model proposes that the successful implementation of QM can be heightened when there is a balance between enhancing the enablers of quality improvement and minimising the impact of improvement barriers. This was confirmed by Sandström & Svanberg, (2011, p.14) who stressed that by not identifying the barriers, the implementation of QM initiatives may be delayed over an unnecessary time-period and may result in added costs and resources.

The Quality Improvement (QI) Model has been developed for both case organisations used this study. The model is built on the concept that QM is a network of interdependent mechanisms that work together to accomplish the aim of the system (Deming, 1994, p. 50; Hellsten & Klefsjö, 2000, p.238). These mechanisms refer to the principles, techniques and tools. The principles are the foundation upon which the organisation builds its quality culture, such as management commitment, leadership and employee focus. Techniques are the activities or

actions the organisation uses to achieve the principles, such as performance measurement. Tools are devices which sometimes have a statistical basis to support decision making or facilitate analysis of data, such as histogram and pareto diagram. These three components are implemented together to achieve continuous quality improvement.

Fundamentally, this model links the seven factors of QM that were identified in this study, and the barriers hindering their implementation. The model provides a comprehensive foundation for QM implementation in both case organisations because it takes the internal and external barriers hindering QM implementation into consideration. Figure 6.4 illustrates the model for QM implementation
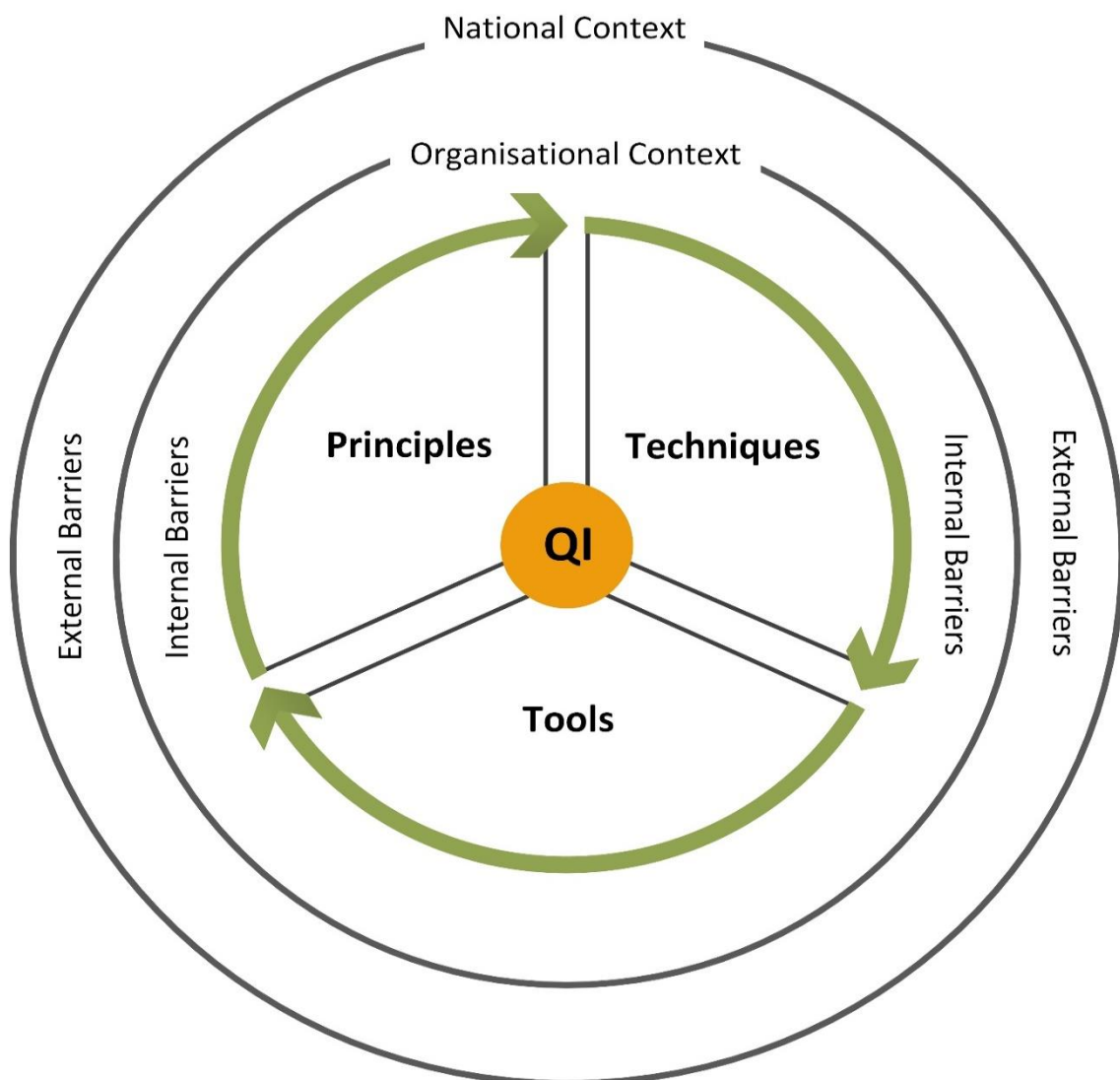
Figure 6.3 Quality Improvement Model (By the Author)

This model recommends adapting an integrated approach between the three components to fit to a specific organisation's context at a specific time. As Dahlgaard, Chen, Jang, Banegas & Dahlgaard-Park (2013, p.526) suggest, a model should be flexible so that organisations can adapt it to new needs and challenges. The model emphasises that the tools and techniques required for improvement depend on the context as well as recognition of the national (Nigerian) and organisational contextual barriers that might prevent the implementation of these techniques and tools.

According to Dahlgaard et.al (2013, p.526) a model should have two purposes: the first purpose is guiding the organisation towards improvement, and the second purpose is assessing its performance. Guiding it towards improvement is the primary purpose and conducting the assessment is the secondary purpose.

The aim of the QI model is to facilitate the implementation of QM initiatives in Nigerian PSOs in order to improve the quality of public products and services. The model has three main objectives;

i. To familiarize the case organisations with the concept of QM implementation via an integrated approach.

ii. To emphasis the identification of barriers to QM implementation and reducing or elimination them.

iii. To enable self-assessment in these organisations to obtain a verdict for areas of improvement.

The first objective of this model is for organisations to recognise that principles are implemented using techniques and these techniques will not work efficiently without the proper use of precise tools. This is important as some findings reveal that some organisations fixate on QM techniques and QM tools compared to QM principles when attempting to implement QM initiatives (Leong, Zakuan & Saman, 2012, p.689; Seymour & Low, 1990, p.15). The QM principles identified in this study from both case organisations (see sections 4.1.1, 5.1.4 and section 6.1.4) through factor analysis are Management commitment, Customer Focus, Employee Engagement, Organisational Change and Continuous Improvement.

The second objective is be aware of the external and internal barriers which will hinder QM implementation. When implementing QM principles, organisations are advised to take into consideration barriers that will obstruct or are working to obstruct the successful implementation of QM principles. Management must work to eliminate internal barriers which

are under their control and try to reduce the impact of internal barriers. To do this, suitable techniques must be identified for use in the organisation to aid the implementation of the QM principles. The QM techniques identified in this study for both organisations are Strategy Deployment, Employee Training and Performance management and Quality Circle. The tools identified in this study are Control charts and Survey. The major external barriers identified in this study that are hindering QM implementation are; Inadequate facilities, Inadequate infrastructure and abandonment of projects due to lack of funds while major internal barriers to QM implementation in this study were identified as Lack of training, Lack of management commitment, Lack of performance measurement for quality improvement and lack of reward and recognition system in the organisation.

Figure 6.5 below presents the model with QM implementation factors and barriers identified in this study;
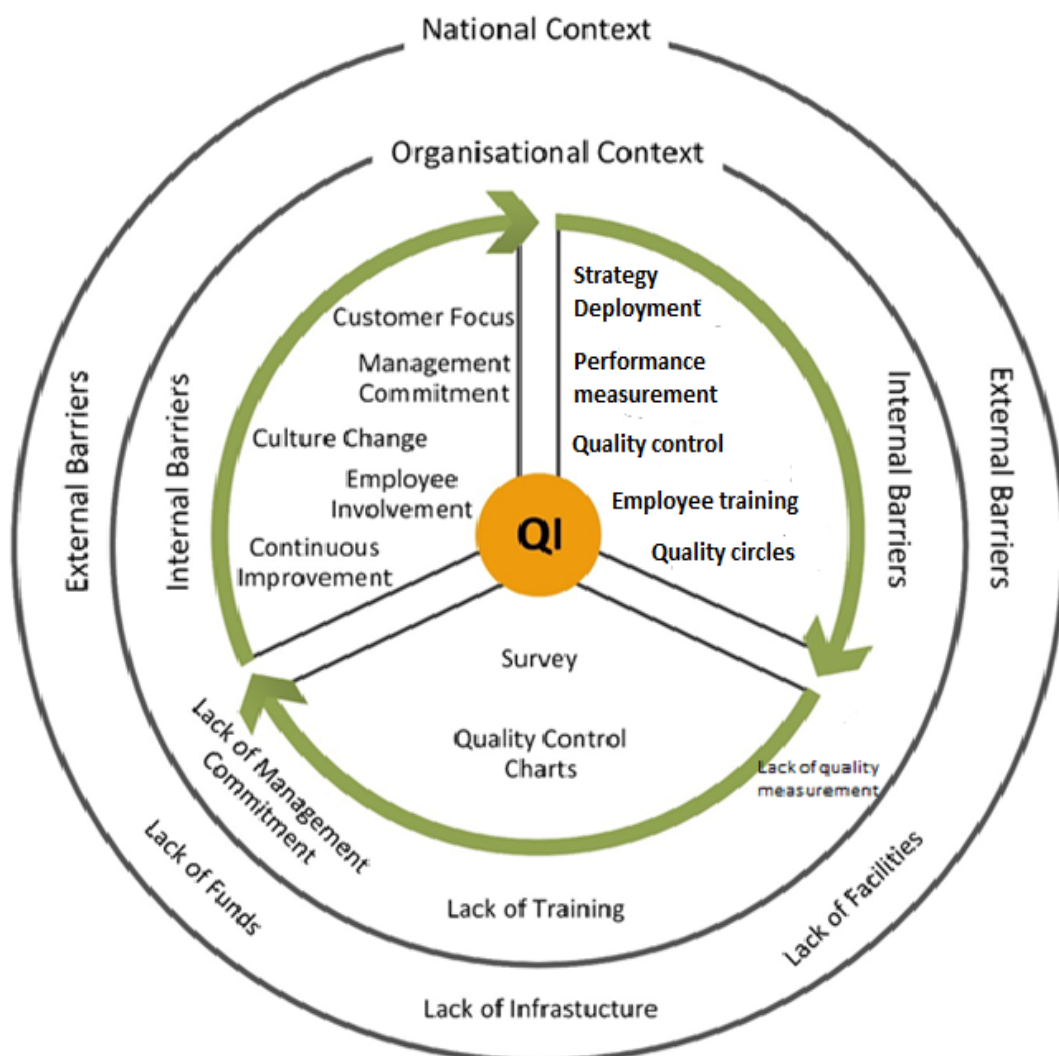
Figure 6.5 Quality Improvement (QI) Model (Source: The Author)

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The final objective of the QI model is self-assessment. Self-assessment to assess the integration of all QM components. Organisations must also encourage continuous self-assessment to identify areas which need improvements. This is because QM is a system which continuously evolves, principles change or the interpretation of some of them might be developed. New techniques and tools will also be developed or transferred from other management theories or other disciplines (Hellsten & Klefsjö 2000, p.240).

Variables grouped together to create a factor by factor analysis (see section 6.1.4) should be used as criteria for self-assessment. For instance, the principle of Management commitment was assessed using the following variables;

1. Senior management have clear vision toward quality, this guides all aspects of running our organisation.
2. Senior executives are visibly and explicitly committed to quality.
3. Top management allocates adequate resources for quality management efforts.
4. Top management allocates adequate time for quality management efforts.
5. There is strategic quality planning of the long-term quality journey.

Assessment of this factor was done based on responses from employees concerning each criterion to determine the perceived level of implementation of this factor. Therefore, assessment must be done taking each criterion into account.

6.5 **Chapter Summary**

This chapter presented the cross-case analysis and findings of the data collected through questionnaires and interviews. Seven factors were identified by factor analysis for QM implementation. In addition, the level of QM implementation was found to be medium. The major internal and external barriers to QM implementation were also identified

Findings from the interviews also support the questionnaire results as lack of funds was identified as a major factor inhibiting implementation of QM in both organisations. Inadequate facilities, inadequate infrastructure and abandonment of projects already embarked on were all linked to lack of funding from the government. The interviews also echoed the perceived level of implementation of QM which was found to be medium. The interviewees suggested areas of possible improvement which included continuous training of staff in quality issues and reforms in government policy formation to accommodate organisations which have unique needs different from the core civil service organisations. A model was also proposed for the implementation of QM initiatives in both case organisations. This model can be used across a

wide range of organisations such as other public sector organisations, manufacturing industry and service sector. The Quality Improvement (QI) Model is built on the concept that QM is a network of interdependent mechanisms that work together to accomplish the aim of the system. This model proposes that the successful implementation of QM can be heightened when there is a balance between enhancing the enablers of quality improvement and minimising the impact of improvement barriers.

In conclusion, the successful implementation of QM in organisations can be achieved by a gradual approach, based on progression and the selection of appropriate management actions some of which will be discussed in the next chapter. In addition, it can be noted that each organisation can overcome the barriers related to QM implementation by taking administrative procedures to address them.

In the next chapter, limitations of this study are highlighted as well as areas for further studies.

CHAPTER 7

CONCLUSION, CONTRIBUTION AND RECOMMENDATIONS

7.1 Introduction

QM is considered as a philosophy which encourages continuous improvement of the quality of products, processes and services, alongside improving efficiency and bringing down expenses (Mosadeghrad 2013, p.3). This study at assessed the implementation of QM initiatives in Nigerian public sector organisations, with a focus on two organisations within the Nigerian space industry. Specifically, this study aimed at identifying the QM factors for successful quality improvement implementation and the barriers obstructing improvement efforts based on the perception of employees in these organisations. These objectives have been achieved by investigating the following questions;

1. How is quality defined by Nigerian PSOs in the space industry?
2. What is the common approach/approaches utilised by Nigerian PSOs in the space sector in implementing QM?
3. What are the QM factors necessary for successful QM implementation as perceived by employees in these organisations?
4. What is the perceived level of implementation of QM factors?
5. What are the QM factors that should be considered at every management level of the organisations in this study, to encourage QM implementation?
6. What are the barriers hindering the on-going implementation of QM initiatives in these organisations?

7.2 Research Process Summary

It has been stated that quality can be defined in many ways due to its diverse understandings among academics, people in business and the general public who are the end users of products and services (Speegle, 2010, p. 12; Ebrahimi & Sadeghi, 2013, p. 5626). Thematic analysis of interview transcript has led to the adoption of a definition of quality in the context of this research as *'a dynamic state associated with products, services, people and processes that meets or exceeds expectations and helps produce superior value'* – Goetsch & Davies (2013, p.4)

This study made use of questionnaires and interviews to realise the objectives of this study. Results from the factor analysis identified the QM implementation factors that are necessary for quality improvement in each case organisation. Additionally, semi-structured interviews provided insight into how employees perceive the implementation of QM and barriers affecting the implementation.

Cross case analysis identified seven QM implementation factors; Management Commitment, Organisational Culture Change, Strategic Deployment, Employee Training, Employee Engagement, Organisational Performance Measurement and Management, and Continuous improvement.

Subsequently, factor analysis for the individual case organisations identified three QM implementation factors for each organisation. QM implementation factors identified for SD were; Management Commitment and Leadership, Strategy Deployment and Employee Engagement (see section 4.1.4). QM factors identified for NR were; Customer Focus, Employee Focus and Organisational Performance Measurement (see section 5.1.4). Results from descriptive analysis indicated that overall, QM implementation is perceived to be at a medium level of implementation in both organisations (see sections 6.1.5 and section 6.1.5). This result could suggest that these organisations have attempted implementing these QM factors in their organisation and progress is being made to establish a quality management system. More so, descriptive analysis also provided results for the perceived level of implementation for each factor identified in each organisation, as perceived by managers on different management level and non-management (see sections 4.1.6 and 5.1.6).

Further analysis identified inadequate facilities as the major external barrier for QM implementation for both organisations while lack of innovation and creativity was identified as the least external barrier for QM implementation in SD. Changes in projects already embarked upon was identified as the least external barrier for QM implementation in NR (see section 6.1.6). Lack of training programs relating to QM was identified as the biggest internal barrier for QM implementation in SD while lack of a recognition system was identified as the least internal barrier. The least internal barrier in both SD and NR was found to be resistance from employees (see section 6.1.7).

7.3 Research Contributions

The following are considered to be the contributions of this study;

1. This study is considered to offer a significant contribution to the field of QM implementation in terms of public sector organisations. This study determined the critical success factors for successful implementation of quality initiatives in the context of public organisations in the Nigerian space industry.

2. This study is considered to be the first to have assessed and estimated the perceived levels of QM implementation in Nigerian PSOs in the space industry. In addition, this study is considered to be the first in Nigeria to investigate the differences in critical success factors between organisations in the space industry.

3. The findings of this study provide managers of these case study organisations with practical understanding of the barriers that are likely to be obstructing QM implementation. Managers should overcome these barriers in order to achieve a successful QM implementation.

4. The results of this study can be of benefit to other public sector organisations in other African countries with similar structure, culture and environment, to learn the best practices when implementing quality improvement initiatives and to understand the potential enablers and barriers in the area.

5. The study is considered to be a source of information for QM research in Nigeria and as a reference for similar environments such as other African countries.

6. The findings of this study have been used to develop a model which provides a framework for the implementation of QM in PSOs in the Nigerian space industry (see figure 6.4). This framework can be applied in other PSOs in the Nigerian space industry as well as other PSOs with similar management structures such as PSO's in manufacturing, information technology and services.

7. The model created in this study can be applied in other PSOs with slight changes to suit their organisation. The model can be used to improve quality in these organisations by integrating all the components of QM while taking into consideration, the external and internal barriers to QM implementation.

8. This study provides recommendations for case organisations used in this study to facilitate QM implementation.

7.4 Limitations of the study

As with all other studies, this research had some limitations, and therefore, the findings should be interpreted in relation to these limitations, which are subsequently discussed along with some recommendations for future research endeavours

- This study was conducted in only two PSOs in the Nigerian space industry. This does not affect the results of the study. However, caution must be applied as the findings might not be transferable to PSOs in other industries or PSOs in other countries.

- The data collected for this study was a comparatively small sample size which may be affected by common method bias and non-response bias. However, tests were carried out to validate the set of data and results were tested for reliability and trustworthiness.

- There is a lack of academic research in Africa focusing on QM implementation within organisations in the space industry especially PSOs. This matter means the researcher could not make a comparative analysis exploring what is happening in the Nigerian environment with other African countries. The conduct of a comparative research is recommended for further work.

- This study was also limited by time constraints as is the case for many researches. This limitation compelled the research to a cross-sectional investigation, rather than a longitudinal study, or both.

- There were some difficulties in gaining access to collect data from one of the organisations in this study. This caused a delay in the analysis of the data and further delays in the research process.

- The researcher had limited funds available to her for carrying out this study. The research was also limited by the distance and cost of travel between the University of Portsmouth and Nigeria, where the case study organisations are located. However, to make the best of the cross-sectional study, substantial attention was given to developing the research design, sampling and adopting procedures for analysis so that the sample collected represents applications in the Nigerian context. The researcher adopted a mixed method approach to data collection making use of a questionnaire instrument and semi-structured interviews. The questionnaire and interview guide were designed to contain questions that capture the state of QM implementation in these organisations. Both methods have their limitations (see sections 3.2.7.2 and 3.2.7.3), which could lead to bias, but the decision to adopt more than one method of data collection makes the findings more valid and helps to control bias.

- Another major limitation is the testing of the model derived from the findings in this study. This model has not been tested in any organisation to evaluate its validity.

7.5 Direction for future studies

This exploratory study provides not just new knowledge on QM implementation in Nigerian public sector organisations but additionally provides opportunities for further studies. The opportunities for further studies that stem from this research include:

- Further studies to assess the degree to which the recommendations of this study have been followed by the organisations used as case studies in this research.
- Future research works should sample more than two Nigerian PSOs within the space industry to include the remaining organisations within this industry.
- The "Quality Improvement Model" developed in this research could be examined in different organisational and national contexts to validate the model.
- The study was conducted among employees of PSOs in the space industry, hence, future studies could be conducted among customers to gain insight from their perception of QM implementation factors such as communication, performance, service. This study is among many studies which has investigated QM implementation from the perspective of the producers of goods and services (Pimentel & Major, 2015; Kosgie, 2013; Talib, Rahman & Azam, 2011). The essence of QM is to create value for the customer, and there are situations where customer value from the point of view of the producer may differ from the point of view of the customers (Lengnick-Hall, 1996, p.798). Therefore, it is necessary to explore the knowledge and perceptions of customers about QM implementation in these government organisations.

7.6 Recommendations for PSOs in the Nigerian space industry

Based on the conclusions from the findings of this study, a set of recommendations, which may be useful in the implementation of QM by both case organisations and other organisations within the Nigerian space industry, is provided. Given that the analysis was carried out for each case organisation, recommendations have been made for each organisation and overall recommendations have also been made.

7.6.1 Recommendations for SD

- Full commitment by management

Senior management could consider adopting a more proactive approach to QM implementation and to take more accountability for the effectiveness of the QM implementation factors. Leaders need to be completely dedicated and supportive of quality management efforts by creating a vision that inspires their employees to accomplish the organisation's objectives (Deming, 1982, p.54; Dale et.al, 2016, p.30). This can be achieved by creating a long-term clear vision toward quality, covering every aspect of the organisation. This can also be achieved by setting targets or goals for all employees at all levels and define them. This will act as the indicators of accomplishment regarding the organisation's mission (Talib, 2013, p.12)

- Employee Engagement

The senior management in SD could give more consideration to advancing employee involvement in the decision-making process, and delegation of authority and responsibilities. This will make all employees feel they have the duty to participate in decision making and problem solving at the suitable working levels (Dale et.al, 2016, p.24). It is vital that the employee comprehends the quality requirements of his or her work. Employee engagement is achievable through high involvement and empowerment of the employee. Quality circles and suggestion schemes are ways of engaging employees in quality issues (Patro, 2013, p.2693)

- Employee Training

  More emphasis should be put on training in QM for employees at all levels, which will prompt continuous improvement in organisational procedures. To tackle the issue of limited funding, this can be achieved with the Training with-in industry (TWI) programme which involves hands on learning on the job (Graupp & Wrona, 2016, p.13). This programme is believed to eliminate common problems and improve processes, managers or anyone who has already being trained and directs the work of others, have to take up the job role of a trainer. (Džubáková & Kopdak, 2015, p.47)

- Reduction in Bureaucratic processes

  Management should consider reducing bureaucracy within the system which affects the completion and delivery times for products and services. Having different individuals or committees support a decision and different low-level guidelines makes carrying out jobs slower, more difficult, or both (Patro, 2013, p.2690) It also causes administrative delay which hinders the achievement of goals and objectives, for individual employees and the organisation

as a whole (Mosadeghrad, 2013, p.150). Management can reduce bureaucratic processes by limiting the number of signatories to applications and shortening the response time for certain applications or requests to a minimum number of days as possible. This will help to speed up the process of decision making, save time and increase efficiency within the system (Patro, 2013, p.2691)

- Creating an effective performance measurement system

Some research indicates that some organisations implement a performance measurement system that is not efficient and produces results that are not to the satisfaction of management or employees in the organisation (Ridley, 2007, p.32; Mosadeghrad, 2014, p.331). This inefficiency could be caused by the lack of a clear standard, a lack of clarity on what is being evaluated or a lack of understanding of feedback (Baker, 2010, p.478). In this study, there was a concern that measurement is not carried out correctly (see section 4.2.3.8). Measurement should be viewed as an important aspect of quality improvement; therefore, a validated system of performance measurement should be introduced in the organisation. It is also recommended that these measurements are done continually, and feedback should be given to staff to provide encouragement that things are getting better (Dale et.al, 2016, p.24)

Management of SD should consider creating an effective feedback mechanism which should be integrated into the system with feedback provided on a regular basis as some research has indicated that feedback plays an important role in quality improvement in organisations (Dar, 2018, p.852). A feedback system guarantees a comprehensive analysis of the performance of employees. Employee feedback should give clear indications concerning the performance accomplished by the employee as well as, the performance that is anticipated. The performance evaluation of employee should be an assessment of how well an employee is meeting the performance standards set up by an organisation. Effective feedback should be limited to a particular number of points that are clearly defined and directly related to responsibilities under the control of the employee. Giving feedback to employees provides reassurance that there are signs of improvement (Dale et.al, 2016, p.24).

7.6.2 Recommendations for NR

- Establish a Rewards and Recognition system

  Management in NR should consider setting up a suitable reward and recognition system to suit the needs of the organisation. A clear list of criteria should be outlined defining the rewards, and these criteria should be known to every employee. Rewards can be

given in monetary or non-monetary forms. Non-monetary forms could be in form of a letter of appreciation, extra leave or opportunity to attend a training course, gifts, prizes or whatever the employees in the organisation are probably going to appreciate (Nasir, 2015, p.7)

- Employee Training

As suggested for SD, emphasis should also be put on training in QM for employees at all levels in NR. Senior management in NR should determine the training needs of their employees systematically and put more emphasis on training in QM for employees at all levels, which will lead to continuous improvement in their processes.

7.6.3 Recommendations for both organisations

- Culture change- Both organisations should recognise that effective implementation of QM requires an organisational culture that encourages open communication and employee involvement to facilitate change and provides the resources necessary for continuous improvement. QM also needs to be integrated throughout an organisation's processes and functions and this requires a change in the culture, behaviour, attitudes and working practices of employees.

- The Nigerian government should establish an effective information system for the purpose of data collection. Information gathered from these organisations can provide insights and direct the government on the needs of the organisations in this sector. QM can only be implemented when policies are made to create a favourable environment for the implementation process.

- The Nigerian government needs to take a more central role in encouraging the importance of QM by taking into consideration the needs of organisations in different sectors such as training needs. Policies should be made after consultation with organisations in different industries to make sure that these policies do not have a negative effect on the quality improvement efforts of the organisation. Where the training needs of a whole industry cannot be met by local competencies, a policy that prevents the organisation from gaining such trainings outside the country will affect the quality of products and services of such an organisation.

- The Nigerian government can also play an important role in creating a quality environment by stressing the importance of quality for all public sector organisations. This can be achieved by establishing an annual award for QM. This will raise the awareness of quality of service in the public sector, encourage continuous improvement and eliminate the fear of

change. Examples of such awards include; Public Service Award of Excellence in Canada, Galing Pook Awards in the Philippines, and the King Abdullah II Awards for Excellence in Government, in Jordan (World Bank, 2010)

7.7 Chapter Summary

This chapter gives a summary of the novelty of this research and the contributions to knowledge. The chapter gives a summary of the research carried out, the findings from the analysis, the contribution of the study to the body of knowledge, the limitations, recommendations for both case organisations used in this study and also directions for further studies.

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Term	Explanation
5S	5S is a philosophy for good housekeeping to achieving order, efficiency and discipline in the workplace. 5S is derived from the Japanese words meaning Sort, Straighten, Shine, Systematize and Standardise.
Quality Circle	This is a small group of workers who collectively find a problem, discuss alternative remedies, and propose a solution. QCs voluntarily perform improvement activities within the workplace, as part of a company-wide program of mutual education, quality control, self-development and productivity improvement.
Total Quality Control (TQC)	TQC is an organised activity involving everyone (from managers to workers) in a totally integrated effort towards kaizen at every level.
Total Quality Management (TQM)	TQM represents a number of management practices, philosophies and methods to improve the way an organization does business, makes its products, and interacts with its employees and customers. QCC activities function as an integral part of TQM. TQM evolved from TQC in the late 1980s.
Just-In-Time (JIT) System	JIT is a production system aimed at eliminating non-value-adding activities of all kinds and achieving a lean production system flexible enough to accommodate fluctuations in customer orders.

APPENDIX 2: QM implementation in various sectors in Nigeria

	Authors	Sectors	QM Approach
1	Okuntade (2015)	Construction	TQM
2	Oluseye, Borishade, Adeniyi, Ezeugwa Chinelo (2014)	Various higher educational institutions	TQM
3	Ebiringa (2012)	Universities	TQM
4	Umar (2012)	Service	TQM
5	Orumwense (2014)	Various private sector organisations	TQM
6	Obi & Oparanma (2018)	Manufacturing	Quality control
7	Chukwu, Adeghe, Anyasi (2016)	Manufacturing	TQM
8	Ahaotu & Pathirage (2015)	Construction	TQM
9	Shulammite & Addah (2013)	Manufacturing	TQM
10	Awolusi (2013)	Service	TQM
11	Marire Nwankwo & Agbor (2014)	Manufacturing	Quality control
12	Ezeani & Ibijola (2017)	Manufacturing	TQM
13	Monday (2015)	Service	TQM
14	Sule, Ogbadu, Nafiu (2016)	Small and medium enterprises	TQM
15	Ozdal & Oyebamiji (2018)	Public sector (health sector)	TQM
16	Jimoh, Oyewobi, Isa & Waziri (2018)	Construction industry	TQM
17	Hassan (2014)	Service	TQM
18	Nwakanma, Ubani, Asiegbu & Ngene (2014)	Manufacturing	TQM
19	Ibidunni, Salau, Falola, Ayeni & Obunabor (2017).	Telecommunication firms (private sector)	TQM
20	Okpala (2013)	SMEs	TQM
21	Babatunde & Victor (2018)	Public sector (higher education)	TQM
22	Akpan, Amade, Ukwuoma & Nwoko-Omere (2014)	Public sector	TQM

23	Alintah-Abel, Okolie, Emoh &Agu (2018)	Construction industry	TQM
24	Adetunji, Adetunji & Falebita (2015)	Public organisation (higher education)	Quality Assurance
25	Emeje, Ekere, Olayemi, Isimi & Gamaniel (2019)	Public organisation (government agency)	TQM
26	Sule, & Amuni (2017)	Manufacturing	Quality control
27	Olumide, Afolabi, Adeleke (2018)	Manufacturing	Lean
28	Adamu & Abdulhamid (2015)	Construction	lean
29	Umude-Igbru & Price (2015)	Consulting	Lean six Sigma
30	Aigbavboa, & Ohiomah, (2016)	Manufacturing	lean
31	Emeakponuzo, Eno & Etim (2018)	Accounting	lean
32	Okpala (2013)	Accounting	lean
33	Okpala (2013)	Manufacturing	Lean six Sigma
34	Oko & Kang (2015)	Public sector (higher education)	Lean Six Sigma
35	Abidakun, Leramo, Ohunakin, Babarinde & Ekundayo-Osunkoya (2014)	Manufacturing	Six Sigma
36	Okonkwo & Mbachu (2015)	Construction	Six Sigma
37	Uzorh, Nnanna & Olanrewaju (2018)	Manufacturing	Lean six Sigma
38	Agina-Obu (2015)	Manufacturing	Lean six Sigma
39	Ndabako, Bello & Shiyanbade-Iliyasu (2018)	Banking industry	TQM
40	Mojtahedzadeh & Izadi (2013)	Agro-allied industry	TQM
41	Ejionueme (2015)	Public sector	TQM
42	Ayandele, Anietie & Akpan (2015) Manufacturing	Manufacturing	TQM

APPENDIX 3: Quality Management Implementation Factors

	Authors	Management	Customer focus	Training and education	Employee	Communication	Organisational culture	Performance measurement system	Partnership with supplier	Information and data analysis	Resource /Funding/Finances	Process management	Work environment	Strategic planning/ policy	Continuous improvement	Benchmarking	Organisational structure	Vision and Plan statement	Recognition and Reward	Teamwork	Organisational infrastructure
1	Akpan et.al (2014)	×	×	×	×		×								×					×	
2	Fryer & Ogden (2014)	×		×		×		×							×				×		
3	Frączkiewicz-Wronka, Szołtysek, & Kotas (2012)	×			×	×	×			×										×	
4	Talib, Rahman & Qureshi (2010)	×		×	×	×		×	×			×			×	×				×	
5	Sadikoglu & Olcay (2014)	×	×	×				×				×		×							
6	Haque, Sarwar & Yasmin (2013)	×			×		×														
7	Rokke & Yadav (2012)	×	×		×		×	×						×	×						
8	Bajaj, Garg, Sethi (2018)	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×	×	×	×	
9	Ceno, Vira & Kourouklis (2017)	×	×	×		×		×		×					×				×	×	
10	Pimentel & Major (2016)	×	×	×	×		×	×			×	×			×						
11	Lakshmi (2019)			×			×			×	×										
12	Neyestani & Juanzon, (2016)	×	×	×	×	×	×		×	×	×	×			×	×			×	×	
13	Salleh, Zakuan, Ariff, Bahari, Chin, Sulaiman, Yatim, Awang & Saman (2018)	×	×	×	×	×									×				×		
14	Shafiq., Mirza, Abid & Naeem (2014)	×	×	×	×	×			×		×	×			×	×					
15	Zakuan,, Muniandy,Mat Saman, Ariff, Sulaiman, and Jalil (2012)	×	×	×	×	×									×					×	
16	Shibani, Soetanto &. Ganjian (2010)	×		×	×	×	×													×	
17	Rose, Deros & Rahman (2014)	×	×												×						
18	Deshmukh & Mukti (2018)	×	×	×		×	×		×		×	×				×				×	

#	Reference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
19	Arshida, Tun Abdul & Agil (2013)	×	×	×	×			×												×	
20	Kundu & Manohar (2012)	×		×		×	×	×			×										
21	Sabry A. (2014)	×	×	×	×			×	×			×			×	×	×				
22	Bouranta, Psomas, Suárez-Barraza, Jaca, (2019)	×	×	×								×									
23	Bigliardi, & Galati (2014)		×	×	×			×	×			×			×					×	
24	Gherbal., Shibani, Saidani & Sagoo (2012)	×	×	×	×	×											×			×	
25	Adeoti (2011)						×		×	×	×				×					×	
26	Orumwense (2014)	×			×		×								×						
27	Ajmal, Tuomi, Helo & Sandhu (2016)	×	×	×	×		×	×		×	×	×			×	×					
28	Kumar, Garg & Garg	×	×	×		×									×					×	
29	Zubair (2013)	×	×	×	×		×	×				×									
30	Douglas, Douglas & Ochieng (2015)	×					×														×
31	Hietscholt, Reinhardt & Gurtner (2014)	×	×	×	×	×	×		×			×			×	×			×	×	
32	Ibidunni, Salau, Falola, Ayeni & Obunabor (2017).	×	×	×																	
33	Amar (2012)	×		×			×	×							×						
	Total	31	22	25	21	15	18	11	10	7	9	14	1	3	20	8	3	1	7	14	1

APPENDIX 4: Barriers to QM implementation in public sector organisations

	Barriers	**Authors**
1	Lack of top management commitment	Mosadeghrad, (2014), Abdullah et.al (2013); Hassan & Fan (2016); Suleman & Gul (2015); Pedersen & Huniche (2010); Maleyeff (2014); Cătălin et.al (2014); Kosgei (2014); Sajjad & Syed (2017); Bounabri et.al (2013); Asnan et.al (2015); Barraza et.al (2009); Anthony (2014)
2	Insufficient resources/facilities	Mosadeghrad, (2014); Hassan & Fan (2016); Suleman & Gul (2015); Pedersen & Huniche (2010); Maleyeff (2014); Sajjad & Syed (2017); Nkang (2012); Abdullah et.al (2013); Asnan et.al (2015)
3	Inappropriate reward system	Abdullah et.al (2013); Mosadeghrad, (2014); Hassan & Fan (2016); Pedersen & Huniche (2010); Abdullah et.al (2013);
4	Bureaucracy	Mosadeghrad, (2014); Bounabri et.al (2013); Barraza et.al (2009)
5	Ineffective use or lack of quality measurement	Sadikoglu & Olcay (2014); Hassan & Fan (2016); Tuomi, et.al (2013); Anthony (2014)
6	Poor planning	Mosadeghrad, (2014); Abdullah et.al (2013); Suleman & Gul (2015); Suleman & Gul (2015); Sajjad & Syed (2017); Barraza et.al (2009)
7	Lack of training	Mosadeghrad, (2014); Abdullah et.al (2013); Ajmal et.al (2016); Hassan & Fan (2016); Suleman & Gul (2015); Pedersen & Huniche (2010); Kosgei (2014); Sajjad & Syed (2017); Bounabri et.al (2013)
8	Resistance of change by the workforce	Mosadeghrad, (2014); Hassan & Fan (2016); Pedersen & Huniche (2010); Kosgei (2014); Bounabri et.al (2013); Asnan et.al (2015)
9	Poor infrastructure	Suleman & Gul (2015); Nkang (2012)
10	Competing management priorities.	Mosadeghrad, (2014); Maleyeff (2014);
11	Management instability	Mosadeghrad, (2014); Maleyeff (2014); Barraza et.al (2009); Anthony (2014)

12	Weak employee commitment and involvement	Mosadeghrad, (2014); Nkang (2012); Asnan et.al (2015); Barraza et.al (2009); Anthony (2014)
13	Inappropriate/lack of organisational culture change	Mosadeghrad, (2014); Abdullah et.al (2013); Hassan & Fan (2016); Pedersen & Huniche (2010); Bounabri et.al (2013)
14	Poor recognition programme	Mosadeghrad, (2014); Abdullah et.al (2013); Hassan & Fan (2016); Pedersen & Huniche (2010);
15	Weak quality improvement structure	Mosadeghrad, (2014)
16	Lack of customer focus	Mosadeghrad, (2014); Hassan & Fan (2016); Sajjad & Syed (2017)
17	Inadequate use of and teamwork and coordination	Mosadeghrad, (2014); Suleman & Gul (2015)
18	Lack of communication	Abdullah et.al (2013); Hassan & Fan (2016); Pedersen & Huniche (2010); Kosgei (2014); Bounabri et.al (2013); Barraza et.al (2009)
19	Lack of appropriate information systems	Nkang (2012); Hassan & Fan (2016); Abdullah et.al (2013);
20	Political interference	Anthony (2014)

APPENDIX 5: Invitation letter for Questionnaires

UNIVERSITY OF PORTSMOUTH

Research Student: Jennifer Nguseer Lawal,
Operations and Systems Management,
University of Portsmouth,
Email: jennifer.lawal1@myport.ac.uk

First supervisor: Dr Barbara Savage
Operations and Systems Management
University of Portsmouth,
Email: barbara.savage@port.ac.uk

Invitation Letter (Questionnaire)

Study Title: Quality Management Implementation: A Case Study of Nigerian Public Sector Enterprises

Dear Potential Participant,

I am a PhD student at the University of Portsmouth and I am conducting a research on quality management implementation in Nigerian Public Sector organisations. The purpose of this research is to discover the common factors that lead to implementing QM successfully in the Nigerian public sector environment. The primary aim of this research is to examine the challenges facing Nigerian public sector organisations and to evaluate the implementation of Quality Management within these organisations.

I would like to invite you to take part in the research by completing a questionnaire that will take approximately 15 to 30 minutes.

Although all studies have some degree of risk, having reviewed this study using appropriate ethical guidelines, there appears to be no known or anticipated risk to your participation in this study and you will not incur any cost as a result of your participation in this study. Your participation is voluntary. If at any time during this study, before the data is analysed, you wish to withdraw your participation, you are free to do so.

All information you provide is considered confidential. Your name will not appear in any publication or report resulting from this study. Please do not hesitate to contact me via email (jennifer.lawal1@myport.ac.uk) if you have any questions prior to your participation or at any time during the study.

Thank you for reading this letter.

Yours faithfully,

Jennifer N. Lawal

APPENDIX 6: Invitation letter for interviews

Research Student: Jennifer Nguseer Lawal,
Operations and Systems Management,
University of Portsmouth,
Email: jennifer.lawal1@myport.ac.uk

First supervisor: Dr Barbara Savage
Operations and Systems Management
University of Portsmouth,
Email: barbara.savage@port.ac.uk

Invitation Letter (Interview)

Study Title: Quality Management Implementation: A Case Study of Nigerian Public Sector Enterprises.

Dear Potential Participant,

I am a PhD student at the University of Portsmouth and I am conducting a research on Quality Management (QM) implementation in Nigerian Public Sector Organisations. The purpose of this research is to discover the common factors that lead to implementing QM successfully in the Nigerian public sector environment. The primary aim of this research is to examine the challenges facing Nigerian public sector organisation and to evaluate the implementation of Quality Management within these organisations.

Therefore, I would like to invite you to take part in the research and speak to you about your experience with QM practices and its impact on overall performance in your organisation. This interview will take approximately fifty minutes (50 minutes).

Although all studies have some degree of risk, having reviewed this study using appropriate ethical guidelines, there appears to be no known or anticipated risk to your participation in this study and you will not incur any cost as a result of your participation in this study. Your participation is voluntary. If at any time during this study, before data analysis, you wish to withdraw your participation, you are free to do so.

All information you provide is considered confidential. Your name will not appear in any publication or report resulting from this study. Please do not hesitate to contact me via email (jennifer.lawal1@myport.ac.uk) if you have any questions prior to your participation or at any time during the study.

Thank you for reading this letter.

Yours faithfully,

Jennifer N. Lawal

QUESTIONNAIRE

To help us classify your responses statistically, may I ask you a few questions about yourself.

1. Gender: Male ☐   Female ☐

2. Age: ≤ 20 ☐   21-30 ☐   31-40 ☐   41-50 ☐   Over 51 ☐

3. Educational level: Secondary School ☐   Diploma ☐   Bachelor degree ☐
          Master degree ☐   Doctoral degree ☐

4. Your current position: Senior management ☐   Middle management ☐
          Lower management ☐   Non management ☐

5. Number of years of experience in this organisation: < 5 years ☐   5-10 years ☐   11- 15 years ☐
          16-20 years ☐   21-25 years ☐   >25 years ☐

6. Please tick (√) in the box that which best reflects your answer where, strongly disagree indicates that, in your opinion, this is not a challenge you confront with respect to achieving your set targets and objectives. In contrast, a response of strongly agree indicates that, in your opinion, this is a major challenge you confront with respect to achieving your set targets and objectives?

Challenges	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Lack of information flow from top management is a challenge.					
Delays in the completion of projects is a challenge.					
Changes in projects already embarked upon is a challenge.					
Abandonment of projects due to lack of funds is a challenge.					
Inadequate facilities is a challenge.					
Inadequate infrastructure is a challenge					

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
Slow process of decision making is a challenge					
Lack of availability of modern technology is a challenge					
Lack of innovation and creativity within the system is a challenge					

If you face other challenges, please specify them here:

7. What type of quality improvement programme do you have within your organisation? Please tick (√) all that apply

TQM ☐   Lean management ☐   Six Sigma ☐

Lean Six Sigma ☐   Quality control/Quality assurance ☐   5S ☐

Just-In-Time ☐   Quality Circles ☐   I do not know ☐

Other (please specify)

8. The following statements describe elements that constitute effective Quality Management. Please tick (√) in the box that which best reflects your answer. Strongly disagree indicates that, in your opinion, your organisation does not perform well in respect of that element. In contrast, a response of strongly agree indicates that you believe your organisation performs very well in that element.

		Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly Agree
1	Senior management have clear vision toward quality, this guides all aspects of running our organisation.					
2	Senior executives are visibly and explicitly committed to quality.					
3	Top management allocates adequate resources for quality management efforts.					
4	Top management allocates adequate time for quality management efforts.					

5	Top managers often discuss the importance of quality at general meetings.					
6	Top managers support any change required in structure in order to promote the new culture.					
7	In my organisation, there is comprehensive identification of customer needs.					
8	In my organisation, there is alignment of process to satisfy customer needs.					
9	The organisation collects extensive complaint information from customers.					
10	The extensive complaint information from customers, are treated with top priority.					
11	The organisation uses customer surveys and feedback information from customer services in improving its processes and services.					
12	The organisation encourages employees to satisfy customers.					
13	There is a general policy development in the organisation.					
14	There is effective deployment of goals in the organisation.					
15	There is strategic quality planning of the long term quality journey.					
16	Mission statements cover the whole organisation.					
17	Vision statements cover the whole organisation.					
18	Training in the total quality concept is given to all employees in the organisation.					
19	Employees are trained to improve interactive skills (such as communication skills, effective meeting skills, and leadership skills).					
20	Employees are trained in problem identification and problem solving techniques					
21	Seminars and workshops in quality issues are arranged for employees as part of an ongoing process.					
22	Training and education cover all of the workforce.					
23	The organisation encourages employees to suggest ideas for work improvement					
24	Employees are involved in decision-making in day-to-day activities					

#						
25	The organisation's goals and policies are communicated regularly to staff.					
26	The organisation implements employees' suggestions.					
27	Employees are actively involved in quality-related activities.					
28	Employees are encouraged to accept responsibility for quality.					
29	Employees are empowered to implement quality improvement efforts.					
30	Employees are given the necessary resources to solve any quality problems that arise					
31	There is recognition for outstanding performance in the organisation.					
32	There is reward for outstanding performance in the organisation.					
33	Employees and/or teams are recognised for achievements in quality improvement.					
34	There is a communication system inside the organisation that allows easy communication between top management and employees.					
35	There is effective inter-communication between various levels of the organisation.					
36	The organisation uses information systems to provide high quality data in order to achieve high quality customer services.					
37	There is emphasis on prevention of errors rather than their correction.					
38	Self– assessment tools are used to improve performance gaps in the implementation and effectiveness of system, process and practice.					
39	Benchmarking is used to identify the best procedures for improvement from other organisations with similar interests and goals.					
40	Continuous improvement is applied in all operations.					

41	Continuous improvement is applied at all levels.				
42	A team approach is taken as a main feature to solve problems.				
43	Problem-solving and continuous improvement processes are based on facts and systematic analysis.				
44	All employees are trained to look for continuous improvement in their daily work.				
45	Quality improvement culture spreads across the organisation's departments.				

9. Please tick (√) in the box and give your assessment of the extent to which each of the following is a barrier or not barrier in the process of quality management implementation in your organisation.

	Not a barrier	Weak barrier	I do not know	A strong barrier	A very strong barrier
Lack of top management commitment to QM implementation.					
Lack of training programs relating to the quality management.					
Resistance from employees					
Ineffective communication between the organisation and its customers					
Lack of focus on customer satisfaction.					
Lack of commitment to quality strategy requirements.					
Lack of a recognition system.					
Lack of a reward system.					
Lack of use of quality measurement.					
Lack of effective measurement of quality improvement					
Poor organisational communication.					

Others (please specify to what extent) ……………………………………………………

Thank you very much for your participation

APPENDIX 8: Interview questions

1. Please can you describe your job role in this organisation?

2. Please can you describe what you understand by these terms, quality and quality management?

3. Please can you describe the challenges you confront in achieving your mandate as an organisation?

4. Why has quality management been implemented in your organisation?

   b. Who started the implementation of quality management within your organisation?

   c. What exactly has been implemented?
   d. When did you start implementation?
   f. How have you implemented quality management?
   g. How is implementation measured?

5. What factors have enabled quality management implementation in your organisation?

6. Have there been any delays in implementation? If yes, what are the factors that have delayed implementation?

   b. Are these barriers still there?

7. How successful has quality management implementation been in your organisation?

8. Please describe what evidence you have to show that quality management has been implemented within your organisation?

UNIVERSITY OF PORTSMOUTH

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Operations and Systems Management
University of Portsmouth,
Email: barbara.savage@port.ac.uk

CONSENT FORM (QUESTIONNAIRE)

Study Title: Quality Management Implementation: A Case Study of Nigerian Public Sector Enterprises

1. I confirm that I have read and understood the information presented in the invitation letter for the above study. I have had the opportunity to consider the information, ask questions and have been answered satisfactorily.

2. I understand that I may withdraw after the data collection and up until the beginning of the data analysis phase of the research after which no further withdrawal is possible.

3. I understand that data collected during this study, could be requested and looked at by regulatory authorities. I give my permission for any authority, with a legal right of access, to view data. Any promises of confidentiality provided by the researcher will be respected.

4. I consent that any allegations of illegal activity revealed after answering the questionnaire, may be reported to the law enforcement authority.

5. I understand that the results of this study may be published and / or presented at meetings or academic conferences. I give my permission for my anonymous data, which does not identify me, and my contextual information to be disseminated in this way.

6. I agree to the data I contribute being retained for any future research that has been approved by the Faculty of Business and Law Research Ethics Committee.

7. I consent to verbatim quotes being used in publications; I will not be named, as steps will be taken to anonymise contextual information.

8. By signing this form, I agree to take part in the above study.

Name of Participant: Date: Signature:

Research Student: Jennifer Nguseer Lawal,
Operations and Systems Management,
University of Portsmouth,
Email: jennifer.lawal1@myport.ac.uk

First supervisor: Dr Barbara Savage
Operations and Systems Management
University of Portsmouth,
Email: barbara.savage@port.ac.uk

CONSENT FORM (INTERVIEWS)

Study Title: Quality Management Implementation: A Case Study of Nigerian Public Sector Enterprises

1. I confirm that I have read and understood the information presented in the invitation letter for the above study. I have had the opportunity to consider the information, ask questions and have been answered satisfactorily.

2. I understand that I may withdraw after the data collection and up until the beginning of the data analysis phase of the research after which no further withdrawal is possible.

3. I understand that data collected during this study, could be requested and looked at by regulatory authorities. I give my permission for any authority, with a legal right of access, to view data. Any promises of confidentiality provided by the researcher will be respected.

4. I consent that allegations illegal activity revealed during the interview may be reported to the law enforcement authority.

5. I understand that the results of this study may be published and / or presented at meetings or academic conferences. I give my permission for my anonymous data, which does not identify me, and my contextual information to be disseminated in this way.

6. I agree to the data I contribute being retained for any future research that has been approved by the Faculty of Business and Law Research Ethics Committee.

7. I consent for my interview to be audio recorded. The recording will be transcribed and analysed for the purposes of the research. I understand that I will have the opportunity to check and confirm the accuracy of the transcript.

8. I consent to verbatim quotes being used in publications; I will not be named, as steps will be taken to anonymise contextual information.

9. By signing this form, I agree to take part in the above study.

Name of Participant: Date: Signature:

APPENDIX 11: Cumulative Percentage of Variance and Kaiser's rule tables from SPSS

Table 4.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: The Author)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	22.451	49.891	49.891	16.660
2	4.621	10.269	60.160	13.951
3	2.017	4.483	64.643	13.139
4	1.811	4.024	68.668	13.007
5	1.383	3.073	71.741	15.065
6	1.264	2.809	74.550	11.240
7	1.086	2.414	76.964	3.369
8	.994	2.210	79.174	
9	.843	1.873	81.047	
10	.725	1.610	82.657	
11	.699	1.553	84.210	
12	.688	1.529	85.740	
13	.602	1.337	87.076	
14	.594	1.319	88.396	
15	.498	1.107	89.503	
16	.431	.958	90.461	
17	.410	.912	91.373	
18	.383	.850	92.223	
19	.336	.747	92.970	
20	.316	.703	93.673	
21	.272	.603	94.276	
22	.256	.568	94.844	
23	.247	.549	95.393	
24	.211	.469	95.863	
25	.193	.428	96.291	
26	.187	.417	96.707	
27	.177	.394	97.101	
28	.161	.359	97.460	
29	.138	.307	97.766	
30	.129	.286	98.052	

31	.127	.283	98.335	
32	.103	.229	98.564	
33	.099	.220	98.784	
34	.093	.206	98.991	
35	.080	.177	99.168	
36	.071	.159	99.326	
37	.063	.140	99.467	
38	.053	.118	99.585	
39	.041	.092	99.677	
40	.041	.091	99.768	
41	.035	.079	99.846	
42	.026	.057	99.903	
43	.023	.051	99.954	
44	.012	.026	99.980	
45	.009	.020	100.000	
Extraction Method: Principal Component Analysis.				

Table 4.8: Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: The Author)

Total Variance Explained				
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total
1	6.008	50.063	50.063	5.537
2	1.810	15.083	65.145	3.615
3	1.281	10.678	75.823	3.091
4	.627	5.224	81.047	
5	.548	4.569	85.617	
6	.444	3.696	89.313	
7	.383	3.190	92.503	
8	.289	2.406	94.909	
9	.215	1.790	96.700	
10	.174	1.453	98.152	
11	.150	1.249	99.401	
12	.072	.599	100.000	

Table 5.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: The Author)

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	16.677	37.059	37.059	9.740
2	5.533	12.295	49.354	9.690
3	3.173	7.052	56.406	9.936
4	2.837	6.305	62.711	7.699
5	2.541	5.647	68.357	6.175
6	1.818	4.040	72.398	5.504
7	1.765	3.923	76.321	5.520
8	1.389	3.086	79.407	3.338
9	1.016	2.258	81.665	5.261
10	.996	2.213	83.878	
11	.860	1.911	85.789	
12	.767	1.705	87.494	
13	.694	1.543	89.037	
14	.554	1.232	90.269	
15	.497	1.104	91.373	
16	.430	.955	92.328	
17	.397	.883	93.211	
18	.370	.821	94.032	
19	.324	.719	94.751	
20	.284	.631	95.382	
21	.281	.625	96.007	
22	.243	.540	96.547	
23	.215	.477	97.024	
24	.190	.422	97.446	
25	.154	.343	97.789	

Total Variance Explained

26	.132	.294	98.083	
27	.127	.282	98.365	
28	.121	.268	98.633	
29	.093	.206	98.839	
30	.089	.197	99.036	
31	.078	.174	99.210	
32	.069	.153	99.363	
33	.055	.122	99.485	
34	.049	.110	99.595	
35	.046	.102	99.697	
36	.038	.084	99.781	
37	.026	.057	99.838	
38	.021	.047	99.885	
39	.018	.039	99.924	
40	.010	.023	99.947	
41	.009	.020	99.967	
42	.007	.017	99.984	
43	.004	.009	99.992	
44	.002	.005	99.997	
45	.001	.003	100.000	

Table 5.7 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: the Author)

Total Variance Explained				
Component	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	3.113	44.475	44.475	2.772
2	1.675	23.927	68.401	2.072
3	1.091	15.592	83.993	1.950
4	.411	5.867	89.860	

5	.338	4.823	94.683	
6	.202	2.884	97.567	
7	.170	2.433	100.000	

Table 6.4 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: The Author)

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	19.806	44.013	44.013	15.041
2	4.201	9.335	53.348	13.330
3	2.321	5.158	58.506	14.877
4	2.042	4.537	63.044	6.401
5	1.770	3.933	66.976	9.484
6	1.447	3.216	70.193	11.659
7	1.265	2.812	73.005	6.567
8	1.030	2.290	75.294	1.933
9	.944	2.098	77.392	
10	.837	1.859	79.251	
11	.719	1.599	80.850	
12	.677	1.504	82.355	
13	.641	1.424	83.778	
14	.612	1.361	85.139	
15	.564	1.254	86.393	
16	.533	1.185	87.578	
17	.434	.964	88.542	
18	.423	.941	89.483	
19	.388	.863	90.346	
20	.385	.856	91.202	
21	.331	.736	91.938	
22	.314	.697	92.636	
23	.299	.665	93.300	
24	.287	.637	93.937	
25	.256	.568	94.506	
26	.228	.507	95.013	

27	.225	.501	95.513	
28	.211	.469	95.982	
29	.184	.410	96.392	
30	.174	.386	96.778	
31	.162	.359	97.137	
32	.154	.343	97.481	
33	.144	.320	97.801	
34	.124	.276	98.077	
35	.119	.265	98.342	
36	.108	.241	98.584	
37	.103	.230	98.813	
38	.100	.222	99.036	
39	.085	.190	99.225	
40	.071	.157	99.383	
41	.070	.155	99.537	
42	.065	.143	99.681	
43	.053	.119	99.800	
44	.048	.107	99.907	
45	.042	.093	100.000	

Table 6.8 Cumulative Percentage of Variance and Kaiser's rule (Eigenvalue > 1) (Source: The Author)

Total Variance Explained				
Factor	Initial Eigenvalues			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total
1	12.995	43.316	43.316	9.119
2	2.552	8.507	51.823	9.073
3	2.044	6.813	58.636	8.457
4	1.674	5.579	64.215	6.296
5	1.428	4.760	68.975	6.594
6	1.199	3.998	72.973	5.475
7	1.138	3.793	76.767	4.574
8	.715	2.384	79.151	
9	.659	2.196	81.347	
10	.626	2.086	83.433	
11	.526	1.752	85.185	
12	.505	1.682	86.867	
13	.435	1.450	88.317	

14	.400	1.333	89.650	
15	.374	1.247	90.897	
16	.335	1.118	92.015	
17	.309	1.029	93.044	
18	.267	.891	93.935	
19	.264	.880	94.815	
20	.238	.794	95.609	
21	.203	.677	96.286	
22	.186	.620	96.906	
23	.162	.541	97.447	
24	.155	.517	97.963	
25	.141	.469	98.433	
26	.134	.446	98.879	
27	.105	.350	99.229	
28	.091	.302	99.531	
29	.075	.250	99.781	
30	.066	.219	100.000	

Appendix 12: Coding Template

Themes/ Sub-themes	Codes
1. Organization type	a. Research and development b. Satellite manufacture c. Satellite products and services
2. Job role	a. Technical b. Administrative c. Customer service
3. Challenges (external obstacles) preventing QM implementation	a. Lack of facilities b. Inadequate infrastructure c. Insufficient staff d. Lack of local competency in the industry e. Lack of awareness of products and services provided by the organisation f. Government policy (budget) g. Government policy (employment) h. Government policy (training) i. Inadequate funds j. Mismanagement of funds
4. Quality concept	a. Value for money b. Customer focus c. Using minimum amount of resources to get maximum output every time. d. Availability of service e. Continuity f. Global practice g. Cooperate strategy h. Commitment to doing things the right way, anywhere and anytime. i. Putting processes in place to ensure the right things are done
5. Reasons for **QM implementation**	a. To show seriousness b. Benchmarking c. Competition d. An organ of the government carrying out government instructions e. Having a unified way of communication and a unified way of getting output with the larger government body f. To avoid isolation g. increase productivity h. replacing an inefficient process

6.Ways quality management has been implementation	a. Service level agreement b. monitoring and evaluation of the system c. feedback within the system d. hourly, daily and weekly report writing e. performance measurement f. internal and external audits g. review meetings h. partnership with customers i. extended work hours to increase productivity j. creating an organogram k. clearly defining job roles and responsibilities l. further training in areas beneficial to the organization m. quarterly evaluation
7 Enablers of quality management implementation	a. Organisational culture b. Good leadership c. employee engagement d. good communication e. monitory reward
8.Barriers (internal obstacles) to quality management implementation	a. lack of top management commitment b. lack of training c. human factor d. Favouritism e. Bureaucracy f. Responsibility without authority g. Evaluation process not validated h. No feedback system in place i. Not focusing on all the objectives of the organization
9.Benefits of implementation of QM	a. increase in awarded contracts b. increased customer base c. efficient process in place
10Suggested ways improvement	a. Structure the organization b. Set targets c. Define the output d. Have a clear vision

APPENDIX 13: Form UPR16

FORM UPR16

Research Ethics Review Checklist

Please include this completed form as an appendix to your thesis (see the Research Degrees Operational Handbook for more information

Postgraduate Research Student (PGRS) Information	Student ID:	759546
PGRS Name:	Jennifer Nguseer L awal	
Department:	Operations and Systems Management	**First Supervisor** Debbie Reed
Start Date: (or progression date for Prof Doc students)	1/2/2016	

Study Mode and Route:	Part-time	☐	MPhil	☐	MD	☐
	Full-time	√	PhD	√	Professional Doctorate	☐

Title of Thesis:	Quality Management Implementation: A Case Study of Nigerian Public Sector Organisations.
Thesis Word Count: (excluding ancillary data)	74,581

If you are unsure about any of the following, please contact the local representative on your Faculty Ethics Committee for advice. Please note that it is your responsibility to follow the University's Ethics Policy and any relevant University, academic or professional guidelines in the conduct of your study

Although the Ethics Committee may have given your study a favourable opinion, the final responsibility for the ethical conduct of this work lies with the researcher(s).

UKRIO Finished Research Checklist:

(If you would like to know more about the checklist, please see your Faculty or Departmental Ethics Committee rep or see the online version of the full checklist at: http://www.ukrio.org/what-we-do/code-of-practice-for-research/)

a) Have all of your research and findings been reported accurately, honestly and within a reasonable time frame?	YES √	NO ☐
b) Have all contributions to knowledge been acknowledged?	YES √	NO ☐
c) Have you complied with all agreements relating to intellectual property, publication and authorship?	YES √	NO ☐
d) Has your research data been retained in a secure and accessible form and will it remain so for the required duration?	YES √	NO ☐
e) Does your research comply with all legal, ethical, and contractual requirements?	YES √	NO ☐

Candidate Statement:

I have considered the ethical dimensions of the above named research project, and have successfully obtained the necessary ethical approval(s)

Ethical review number(s) from Faculty Ethics Committee (or from NRES/SCREC):	E496
If you have *not* submitted your work for ethical review, and/or you have answered 'No' to one or more of questions a) to e), please explain below why this is so:	
Signed (PGRS):	**Date:** 3/02/2020

APPENDIX 14: Ethics Committee Approval

15 May 2018

Jennifer Lawal
PhD Student
Faculty of Business and Law

Dear Jennifer

Study Title:	Quality Management Implementation: A Case study of Nigerian Public Sector Enterprises
Ethics Committee reference:	`E496`

Thank you for submitting your amendment documents for ethical review. The Ethics Committee was content to grant a favourable ethical opinion on the basis described in the application form, protocol and supporting documentation, with the following stipulation:

The favourable opinion of the EC does not grant permission or approval to undertake the research. Management permission or approval must be obtained from any host organisation, including University of Portsmouth, prior to the start of the study.

The Committee did make one suggestion which you may choose to consider:

On the three consent sheets in relation to the point about the possibility that allegations of illegal activity may be reported, the word 'consent' could be changed to 'understand' or 'am aware'. If choosing to make this change, please remit these forms for the Committee's records at your convenience

Yours sincerely,

BAL Faculty Ethics Ctte

Summary of any ethical considerations:

Documents reviewed

The documents reviewed by Caroline Cox [LCM] + BaL Ethics Committee

Document	Date	Version No.
Application Form	20/03/18	1
Invitation Letter	20/03/18	1
Consent Form	20/03/18	1
Supervisor Email Confirming Application	20/03/18	1
Interview Questions / Topic List	20/03/18	1
Questionnaire	20/03/18	1
Risk Assessment Form	20/03/18	1
Participant Information Sheet(s)	9/04/18	1
Focus Group Rules	9/04/18	1

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements set out by the University of Portsmouth.

After ethical review

Reporting and other requirements

The attached document acts as a reminder that research should be conducted with integrity and gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments

- Notification of serious breaches of the protocol

- Progress reports

- Notifying the end of the study

<u>Feedback</u>

You are invited to give your view of the service that you have received from the Faculty Ethics Committee. If you wish to make your views known please contact the administrator, Christopher Martin.

Please quote this number on all correspondence: E496

Yours sincerely and wishing you every success in your research

Chair

Email:

Enclosures: *"After ethical review – guidance for researchers"*

Copy to: Barbara Savage

Appendix 1

After ethical review – guidance for researchers

This document sets out important guidance for researchers with a favourable opinion from a University of Portsmouth Ethics Committee. Please read the guidance carefully. A failure to follow the guidance could lead to the committee reviewing and possibly revoking its opinion on the research.

It is assumed that the research will commence within 3 months of the date of the favourable ethical opinion or the start date stated in the application, whichever is the latest.

The research must not commence until the researcher has obtained any necessary management permissions or approvals – this is particularly pertinent in cases of research hosted by external organisations. The appropriate head of department should be aware of a member of staff's research plans.

If it is proposed to extend the duration of the study beyond that stated in the application, the Ethics Committee must be informed.

If the research extends beyond a year then an annual progress report must be submitted to the Ethics Committee.

When the study has been completed the Ethics Committee must be notified.

Any proposed substantial amendments must be submitted to the Ethics Committee for review. A substantial amendment is any amendment to the terms of the application for ethical review, or to the protocol or other supporting documentation approved by the Committee that is likely to affect to a significant degree:

(a) the safety or physical or mental integrity of participants
(b) the scientific value of the study
(c) the conduct or management of the study.

A substantial amendment should not be implemented until a favourable ethical opinion has been given by the Committee.

Researchers are reminded of the University's commitments as stated in the Concordat to Support Research Integrity viz:

- maintaining the highest standards of rigour and integrity in all aspects of research
- ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards
- supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice and support for the development of researchers
- using transparent, robust and fair processes to deal with allegations of research misconduct should they arise
- working together to strengthen the integrity of research and to reviewing progress regularly and openly

In ensuring that it meets these commitments the University has adopted the UKRIO Code of Practice for Research. Any breach of this code may be considered as misconduct and may be investigated following the University Procedure for the Investigation of Allegations of Misconduct in Research.

Researchers are advised to use the UKRIO checklist as a simple guide to integrity.