CHALLENGES IN THE CONSTRUCTION OF TELECOMMUNICATION MAST IN GHANA.

By

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MASTER OF SCIENCE

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DECLARATION

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

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ABSTRACT

This research was conducted into the challenges in the construction of telecommunication mast in Ghana where some residents kicking against the construction of the mast in their communities for the fear of hazardous effects of the mast on the people. Helios Tower Managed Services Limited was taken as the case study of this research and the research was carried out through qualitative research method and purposive sampling technique was used to select the samples based on characteristics of the population and objective of the study. The researcher relies on his own judgment when choosing members of the population to participate in this study and he obtain a representative sample by using a sound judgment, which resulted in saving time and money. The targeted population was 75, and about 70(%) of the population response to the researcher which shows positive remark from the public, the other 30(%) of the population failed to response for their own peculiar reasons. Additionally about 45(%) of respondents confirmed no education was provided to the public by any of the authorities in charge of telecom infrastructure works about the construction of mast in the country. The data collected was analysed with sensitivity analysis technique through which it was revealed that proper stakeholder management processes were not followed by both the Ghana Government (NCA) and Telecommunication Network Providers to address the concerns of the public. This created perception of health hazard and fear of towers falling on people and properties at the reach of towers were among others in the minds of the public which were the causes of most communities and neighbours rejecting the mast construction project. However, the public interest in urban areas can only be gained through intensive education and motivation packages for landlords and close neighbours.

Keywords: Challenges, Construction, Telecommunication, Mast, Ghana

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DEDICATION

This Thesis is dedicated to my wife Mrs. Patience Newton, my children Solomon Newton, Rachel Newton, Jeremiah Newton and Freda Newton, my sisters Mary, Louise, and Margaret, and all friends who in diverse ways have helped me in the development of my thesis.

COMMON ACRONYMS

ATC	American Tower Company
CW	Civil Work
ECG	Electricity Company of Ghana
DCE	District Chief Executive
GAEC	Ghana Atomic Energy Commission
GCAA	Ghana Civil Aviation Authority
GFS	Ghana Fire Service
GLO	Global Telecommunication
HT	High Tension
HTG	Helios Towers Ghana
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICT	Information Communication Technology
IMC	Inter – Ministerial Committee
IDL	Institute of Distance Learning
MMDA	Metropolitan, Municipal District Assembly
MTN	Mobile Telecommunication Network
NCA	National Communication Authority
NOC	Network Operation Centre
PDB	Power Distribution Board
PMBOK	Project Management Body of Knowledge
QA	Quality Assurance
SAQ	Site Acquisition
TSS	Technical Site Survey
UK	United Kingdom
VRA	Volta River Authority
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

1.1 Introduction

Challenges in the construction of Telecommunication mast in Ghana. The growing demand for mobile services has increased the construction of mobile telecommunications cell sites in Ghana. However, the very support infrastructures required to enhance quality of service have raised serious public concerns about health hazard related issues. Some of these concerns raised with regard to health hazard, are not supported by existing scientific findings. Researcher will research and investigate into concerns raised by the public related to health issues associated with the cell sites and compare with existing scientific findings and suggest suitable solution to address public concerns about telecommunication cell sites in our environments.

Mobile phone telecommunication cell site project is one of rapid growing construction projects in our sub regions of Africa. In Ghana there are three main companies effectively investing in this project namely; Helios Towers Ghana Managed Services Limited (HTG), American Towers Company Limited (ATC) and Eton Towers Ghana Limited. HTG Managed Services Ltd is cell site construction and managed services company originated from United Kingdom (UK) and migrated to Ghana, Tanzania, and D. R. Congo in West Africa. In Ghana HTG started business in year 2010 through the purchase of over 60 percent of Milicom Ghana Limited (Tigo) shares which had over 750 cell sites. HTG has cell site management as its core business. HTG commenced investment in Build to Suit (BTS) rollout project in 2012 with

first request from Vodafone Ghana, followed by Togo request from 2013 to 2014 and MTN's request in 2016. Now HTG has over 1500 Cell sites in Ghana.

Cell sites are indiscriminately distributed across the length and breadth of the country, at homes, rooftops school campuses, market areas, lorry parks, on mountains, public centers etc. They are built at where network services are needed without much education about the hazard and mitigation measures to put in place. The health hazard by telecommunication cell sites construction, management and decommission has become a general debate in the public domain since mobile telecommunication came to Ghana. Majority has no answer to this public debate. The debate raised categorize health hazard by the cell sites in different types which will be identified by the researcher and will find suitable stakeholder management to erase the public concerns. This education will prepare the minds of the general public to accept the erection of towers in the community because the services are needed to accelerate development in every society.

1.2 Background Information

1.2.1 Early Telecommunication System

This is only one aspect of a communication explosion; the latest phase of a long development during which a man has learned to use speech, gesture, and facial expressions to convey his thoughts. Perhaps the most important point in this development was when he first learned to speak, but it has been his ability to communicate over longer and longer distances in shorter and shorter times that has played such an important part in explosive development of civilization over the last few hundred years.

For thousands of years, messages could be transmitted not faster than the speed of the best athlete or the swiftest horse. Ten miles an hour was the most that could be achieved and although this could to some extent be improved upon by such things as carrier pigeons (Brown, 1986). African tom-tom and Indian signal fires the improvement was not really significant. It was towards the end of 17th century that Robert Hooke, the English physicist and chemist gave a discourse to the Royal Society in which he described visual telegraph system using the telescopes that had recently become available. It was another hundred years before Hooke's ideas were put into practice by the brilliant French engineer Claude Chappe.

Inspired by the chaotic social conditions of the time, Chappe provided France with a communication system consisting of towers, usually on hills, on whose roofs were mounted vertical wooden extensions (Herbert Taub, 2002). On this extension was provided a horizontal beam that could be swung to various angles by ropes. Two further movable vertical arms were fitted to the horizontal beams. The letters of the alphabet were represented by different configurations of the arms and the beam and could be read by a man with telescope on another tower, who then relayed the message on to the next one. A 230kilometer line of optical telegraph stations between Paris and Lille proved so successful that the whole of France was linked into the system (Herbert Taub, Donald Schilling, 2002).

1.2.2 The Electrical Telegraph

By the middle of the 18th century even before Chappe built his first optical telegraph men were beginning to appreciate that electricity travelled at an enormous speed and that was growing interest in idea of using it for telegraph (Brown, 1986).

1.2.3 Telephone

Electric telegraph signal travel at enormous speeds but telegraphy is still rather slow carrying on a dialogue because each individual letter of the word had to be transmitted and replies usually take several hours to arrive. Many pioneers realized that a benefit of it would be if human speech could be transmitted directly over telegraph wires (Uyless Black, 2002). One impractical idea was put forward in a book called *A "Treatise concerning some Acoustic Instruments and the use of the speaking tube in telegraphy"* published in 1796 in Berlin. G Huth put forward the idea that on clear night trumpets might be used to pass shouted messages between towers six miles apart.

Despite impracticability of this scheme, Huth has claim to fame because he suggested that telegraph communication by speaking tube be described by a word derived from the Greek. That word was telephone, and Huth was the first man to use it. The success of the early electric telegraph caused many 19th century inventors to turn their attention to the problem of devising a means for transmitting speech over the existing electrical telegraph lines. Alexander Graham Bell stated, *"if I could make a current of electricity vary in intensity precisely as air varies density during the production of sound I should be able to transmit speech telegraphically by the use of carbon microphone"*.

Hence, one remarkable question is, what of the future? There can be little doubt that were it not for communication satellites there would by now be many more cable systems in operation than there are. In late 1968 it was still not clear what the eventual relative importance of communication satellites and Submarine telephone cable would be. Nevertheless, what little

evidence there was seemed to point toward a very slow swing in favour of cable, during the decade 1958 – 68 the cost of submarine telephone channels has come down by a factor of 20 which is impressive by any standards, R.J. Halsey, the director of research of the British Post Office Research Station, pointed out that it would be technically feasible to transmit even television pictures over submarine telephone cables in future (Brown, 1986).

1.2.4 Radio

Despite the great advances in electric telegraph during 19th century, and with the benefits of electronic switching there would still be many parts of the surface of the Earth that could not be connected into the international network if a new medium-radio-had not been discovered. The oceans of the world are one such area. Also contact with moving vehicles, aircrafts, and troops and so on would be impossible (William Stallings, 2005).

Telecommunication in Ghana started with Ghana Telecom landline or fixed line network which was relatively reliable to all citizens. Ghana telecom operated on fixed line post-paid lines connecting subscribers to the telephone exchange equipment. Some landlines are still common in some public offices provided by Vodafone formerly the Ghana Telecom, some standing phone boots still exist in some towns in the country as white elephants. They are no longer in use. Mobile phone telecommunication network came to Ghana through Millicom Ghana Limited then operators of Mobitel in 1992 they initiated cellular phone service and that year 19,000 Ghanaians subscribed to the network. Mobile phone users in Ghana increased to 43,000 in 1998 and 68,000 in 1999. Scancom the operators of MTN were the second to enter in to mobile phone market in Ghana followed by Ghana Telecom mobile phone network called

OneTouch; Zain network which changed to Airtel, Westel network which upgraded to Kassapah, and finally Globacom (Glo) came.

Scancom registered legally to operate business in mobile telecommunication in Ghana in 1994 with authorization to operate GSM system. Scancom launched its network in 1996 with the trade name Spacefone. It later changed to Areeba and now MTN which it says has brought positive change to Ghana with mobile technology. Mobile phone telecommunication service providers use telecom mast (cell sites) as key infrastructure to provide their services which generated serious public debates about the health hazard of these mobile telephone telecommunication masts. Mobile phone telecommunication service providers massively erected communication masts indiscriminately in Accra, Kumasi Takoradi, Tamale and other regional and district capitals alleged (https://en.wikipedia.org/wiki/Telecommunications_in_ Ghana, 2012).

1.3 Problem Statement

Some Communities in Ghana kicked against the construction of telecom towers with the alleged health hazard on humans (NCA report 2010). This human postulation is making it difficult for HTG to acquire landed property to build telecommunication towers in Accra, Kumasi, Takoradi, Cape Coast and Tamale among others. In 2010 research was carried out by NCA to setup guidelines for the deployment of mobile telecommunication masts in Ghana however some of the key stakeholder in the industry are not aware of these guidelines. The researcher wished to use this opportunity to research and identify the challenges of the stakeholders, analyse them and propose suitable solutions to improve these challenges to make

it possible for every neighbour and community to welcome the construction of telecommunication masts to enhance communication among the people and also accelerate development of the nation (Government of Ghana Guidelines for deployment of telecommunication mast 2010).

1.4 Aim

The aim of this study is to identify the challenges associated with installation of telecommunication masts by telecom infrastructure companies in Ghana.

1.5 Specific Objectives

The main aim of the study was guided by the following specific objectives.

1. To identify key stakeholders
2. To identify the challenges of the key stakeholders
3. To propose measures to improve upon the challenges.

1.6 Research Question

The following research questions were used to achieve the research objectives.

1. What are the key stakeholders in the construction of telecom towers?
2. What are the problems facing the key stakeholders in telecom towers construction?
3. What are the appropriate solutions to address the identified problems?

1.7 Overview of the Methodology

Qualitative research approach was chosen for this research work and purposive sampling technique was used based on special qualities like Chiefs, Assemblymen, DCE's, Senior staff of EPA, GFS, GCAA, and other key opinion leaders and landlords/landladies. Sample size of 75 was targeted but 50 was actually reached and primary data was collected from these 50 available samples through interviews. Half of the population were not reached due to time and financial constraints. Sensitivity analysis technique was used to analyse the data collected for the study and result provided in the conclusion below.

1.8 Justification of the Study

The significance of the study stems from the fact that this research aims at bringing to the limelight one of the fundamentals if not the most crucial approach to informing all stakeholders to accept the construction of telecom towers within the reach of each community in Ghana for the expansion and efficiency of the telecommunication industry. In such an attempt, this study will provide insight to the key stakeholders in the construction of telecom towers and the challenges facing these participants during construction. For that matter, the findings of this study will serve as a guide to major decision makers in government, the telecommunication industry and the general populace at large as a step to strategically participate in the development of telecommunication network. To academic institutions, researchers, students and individuals in higher institutes of learning, the findings of this study will serve as the base or point of reference. Beyond this, the conclusions and recommendations of this study will instigate the quest for researchers to discover future oriented policies and practices that can ameliorate the Ghanaian telecommunication industry.

1.9 Organization of the Study

The study is organized in five chapters. The present chapter discusses the introduction to the study which includes the background of the study, the problem statement, the research questions and research objectives, the research method and design, the significance of the study and structure of the study.

Chapter two focuses on review of related literature whilst the research methodology which presents the analytic framework of the study was chronicled in chapter three.

Chapter four focused on the data analysis, presentation and discussions of the research findings in relation to each of the specific research objective. Lastly, chapter five presented the summary of findings, conclusions and recommendations drawn.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The project stakeholder management processes are to identify stakeholders, plan stakeholder engagement, manage stakeholder engagement and monitor stakeholder engagement.

2.1.1 Stakeholder Identification

Identify stakeholders is the process of finding the people who are/will be affected by the project now and throughout the life of the project and analyzing and documenting all relevant information regarding their interest, involvement, independencies, influence and potential impact on the project success or failure depending on the factors above.

Plan stakeholder engagement: Is the process of developing approaches to involve project stakeholders based on their needs, expectations, interest and potential impact on the project.

Manage stakeholder engagement: Is the process of communicating and working with stakeholders to meet their needs, expectations, address issues and substitute stakeholder engagement involvement in a project.

Monitor stakeholder engagement: the process involves monitor project stakeholder relationships and adapting strategies for engaging stakeholders through the modification or engagement policies and plan in the telecom projects. An overview of the project stakeholder management processes intersects and interrelate with each other. Every project has stakeholders who are impacted by or can impact the project in a positive or negative way.

Tailoring consideration is the process of adapting including stakeholder diversity, complexity of stakeholder relationships and communication technology.

2.1.2 Stakeholder Analysis

Stakeholder Analysis: this technique involves identification of stakeholders and analyzing their impact or influence on the project throughout the life cycle of the project. Records from past projects and data gathering techniques such as interviewing and brainstorming, scope and risk management outputs can also help to identify and analyze stakeholders. Stakeholder classification tools such as power/interest can be used to group stakeholders by qualification like authority level, impact or influence (Project Management Institute 2017).

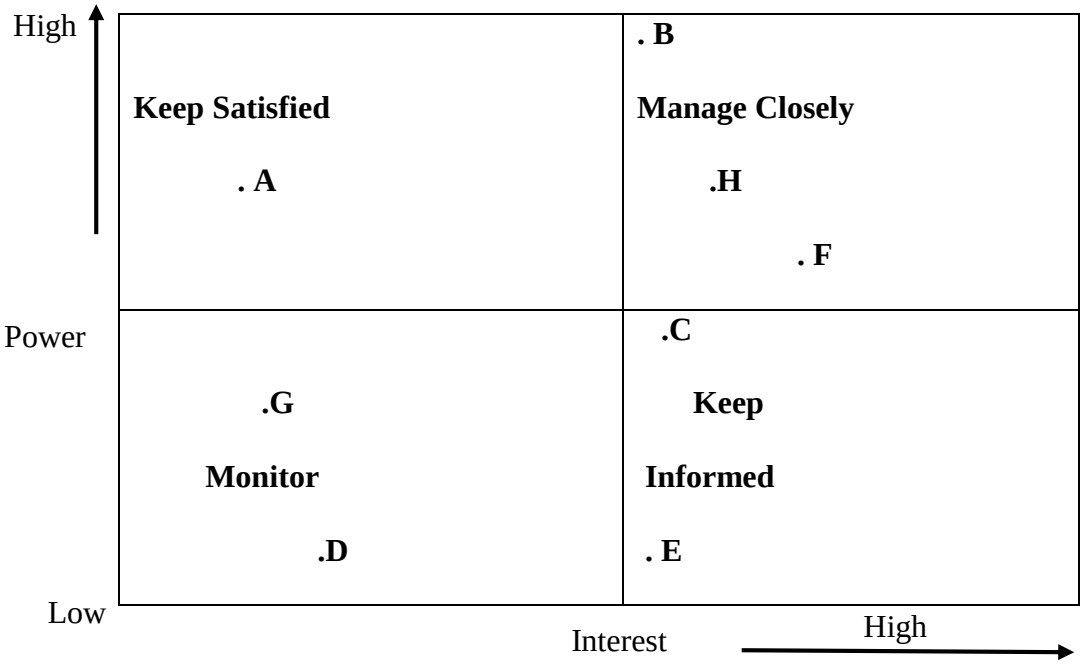

Figure 2.1: Example Power/Interest Grid of Stakeholders (PMBOK 5, 2013)

To ensure comprehensive identification and listing of quality assurance engineers of tower erection companies, site acquisition managers, officials from EPA, GAEC, and MMDAs as key stakeholders, judgment and expertise should be sought from groups or individuals with specialized training or subject matter expertise such as senior management and other units within the organization and identified key stakeholders, and subject matter experts in the business or project area (ANSI/PMI 2013, p. 397).

2.1.3 Stakeholder Output

The main output of the identified stakeholder process is the stakeholder register. This contains all details related to the identified key stakeholders including: Their identification information, assessment information and stakeholder classification depending on the project and these continue throughout the project life period. The stakeholder register is the principal document which should be consulted and updated regularly in the life of the project as stakeholders may change or new ones will be identified throughout the project life cycle (Project Management Institute, 2013).

There are four (4) main classification models available and these are:

Power/Interest Grid i.e., Power: grouping stakeholders based on their level of authority under the construction of telecommunication towers. The landlord or the neighbours has legitimate power to stop the project despite the fact the construction company has financial capability to build the tower. Interest: grouping stakeholders based on their level of concern regarding the project outcomes. The telecom network provider has financial interest to do business and

make profit and end user has interest to communicate with families and friend and also do business with the network to generate fund (Project Management Institute, 2013).

Power/Influence Grid (i.e. Power: grouping based on level of authority. Environmental Protection Authority (EPA), Ghana Civil Aviation Authority (GCAA), Ghana Atomic Energy Commission (GAEC), Metropolitan, Municipal and District Assemblies (MMDAs) has legitimate power to issue or not to issue permit to the construction company in charge to erect a telecom tower. Influence: grouping based on their active involvement in the project. Assemblymen have authority to influence people in the community to protest against the construction of the telecom tower in the community.

Influence/impact Grid (i.e. grouping based on their active involvement: Influence: Their ability to affect changes to the project's planning or execution. The permitting authorities can delay or change the location of the project. Impact: The positive or negative effect the telecom tower has on the landlord or the neighbours in the community.

Salience Model (Example Grouping based on their power or ability to impose their will, need for immediate attention and legitimate. This refer to neighbours of the landlord who has ability to impose their will on the telecom project.

(Project Management Institute, 2017)

2.1.4 Guidelines for the Deployment of Communication Towers.

"Mobile phones and other ICT facilities are vital communication tools for both business and societal development. The growing demand for mobile services have necessitated the increase in communications infrastructure such as towers; which are needed to ensure that there are adequate network coverage and access that guarantee minimum Quality of Service (QoS) (Ghana Government guidelines for the deployment of communication towers, 2010).

However, the very support structures required to enhance quality of service have also raised public concerns; specifically, issues related to health, aesthetics and safety. Some of these concerns specially, with regard to health are not supported by existing scientific findings. That notwithstanding, it is important, through education and creation public awareness, to address the concerns of the public and also take appropriate action to harmonize growth and development on one hand and public safety, perceived or otherwise on the other. Accordingly, to address growth and environmental sanity, an Inter-Ministerial Committee (IMC) was inaugurated to champion the development and implementation of a solution framework. The IMC instituted and Industry Technical Committee (ITC) headed by the National Communications Authority (NCA) to collaborate with industry and other stakeholders: Environmental Protection Agency (EPA), Ghana Civil Aviation Authority (GCAA), Ghana Atomic Energy Commission (GAEC), Metropolitan, Municipal and District Assemblies (MMDAs) to develop a set of guidelines for the institution of a one-stop-shop permitting scheme for the deployment of communication towers" (Ghana Government guidelines for the deployment of communication towers, 2010).

The Terms of Reference for the ITC are as follows:

a) Industry Technical Committee provide clear standards and procedures for the installation of towers and address the issues of environmental sanity, but it was not followed by telecommunication infrastructure companies they always go contrary to the standard and procedures provided by ITC. Example all mast are to be cited 20meters away from residential building but some of the telecom mast are less than 5m away from residents.

b) ITC formulate a cost-effective and efficient mechanism to address administrative and bureaucratic bottlenecks faced by Operators, but operators usually failed to stand by this mechanism and rather went out to build masts without permit for the fear of high permit cost.

c) Design a fair and open cost-based fee policy/structure which would ensure that all Operators are charged fairly by the relevant permitting authorities. The case is not like that in the real world every District Assembly charges different permit fee the ITC policy was not followed by permitting authorities.

d) Though ITC provide policy to facilitate the development of infrastructure to enhance the delivery of quality service and also promote the provision of competitive and affordable services nationwide, the telecom infrastructure companies are not being monitored by ITC to follow the guidelines, tower are now deployed indiscriminately in urban areas in Ghana.

The ITC in fashioning these Guidelines reviewed all relevant bodies of laws and regulations of the institutions responsible for permitting and recommended the following:

1. Institutionalize a one-stop-shop mechanism with defined:

a. application and approval procedures;

b. appellate process;

c. Harmonized fees structure;

d. Monitoring and enforcement.

1. 2. Promotion of public awareness and education; and

2. Encourage co-location to reduce the proliferation of towers.

Though ITC in fashioning these guidelines reviewed all relevant bodies of laws and regulations of the institutions responsible for permitting and recommended above, most of the permitting institutions are not in favour and are not working with the directives of ITC they are chasing their parochial interest. They do not visit cell sites to monitor activities and enforce laws in the country.

2.1.5 Express News Services, Chandigarh, (2016)

The Secretary of Department of Telecommunications, J S Deepak stated at public outstretch and awareness programme on Friday 22nd October 2016 that there is no scientific prove supporting the claim that electromagnetic field radiation from telecom towers causes adverse health hazard. He added the mobile towers in India are said to be safe and emissions are with in prescribe limits therefore radiation from mobile telecom towers are below the safe limits prescribed by International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommended by the World Health Organization (WHO). This explanation was welcome by

the telecommunication industry in most parts of the world including Ghana in Africa which encourage telecom network providers to build towers in homes markets centres, in industries, schools, churches, lorry stations and other public places without fear of radiation emissions (Express News Services 2016).

With reference to Express News Services above there is no scientific proof supporting the claim that electromagnetic field radiation from telecom towers causes adverse health hazard but some individuals still continue to pollute others minds without finding proof to this speculation “telecom mast provide health hazard to humans” (Express News Services 2016).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

Methodology is described as the frame work which is associated with a set of methods and assumptions that is used to conduct research. Research methodology should meet the following criteria:

i. It should be appropriate to the objectives of the research topic.

ii. It should be possible to repeat the methodology used in another research of similar structure.

This Synopsis is an innovation of a researcher who wish to become role model of effective Telecom Project Manager by researching into challenging situation of this kind which will educate the public to accept deployment of telecom towers in their communities without fear of health hazard or falling of the structural mast.

This research is based on Qualitative research method, in order to identify the challenges in construction of telecom towers in Ghana propose suitable measures to improve these challenges. Purposive research technique was used to acquire knowledge and analysed with sensitivity analysis technique.

3.2 Approach to Knowledge

Non-structured interview was selected for this study and interview questions were not designed in specific form for all interviewees to answer the same questions. In this research work researcher adopted non-structured interview because different categories of stakeholders

were contacted to seek knowledge. Purposive sampling technique has been used by selecting samples based on specific quality like; location, Authority, education, experience, impact, interest and power of the sample and objectives of the research, for that reason Chiefs, Assemblymen, Site Acquisition Managers, District Chief Executives' Ghana Civil Aviation Authority Senior Managers, EPA Officials, Ghana Fire Service Officials and landlords were contacted during research interviews.

Some landlords/landladies of HTG cell sites were contacted by the researcher to speak individually for the use of descriptive research approach to acquire information from them. They described the real situation and gave the details of their environment and their relationship with neighbours in the community. The target population include 10 assemblymen, 50 landlords, and 5 officials each from EPA, GAEC, GFS, Metropolitan, Municipal and District Assemblies, 10 Site acquisition mangers in charge of HTG site acquisition works

3.3 Data Analysis

Data Analysis is critically examined in order to understand the parts, establish good relationships and to discover its trends. Qualitative data is a written document which analyzed to establish relationships to propose a suitable solution to the challenges stated in the problem statement above. Sensitivity Analysis Technique is used to analyse data collected through interview of key stakeholders.

- 5 out of 50 interviewees spoke against the tower strength and 3(%) of 12 sites surveyed were not yet built as the result of issues pertaining to tower strength.

- 10 of 50 interviewees spoke against health hazard of the telecommunication mast and 5(%) of 12 sites surveyed within the research period have health hazard challenges.
- 3 of 50 interviewees spoke for demand of life insurance policy cover from telecom infrastructure companies by neighbours and land lords. Impact level (2(%) of 12 sites surveyed within the research period have insurance policy challenges).
- 15 of 50 interviewees complained about lack of education provided by both NCA and telecom infrastructure companies. (5(%) of 12 sites surveyed within research period have challenge with lack of education about telecom mast in Ghana).
- 2 of 50 interviewees complained about litigation between the landlords and other property owners and 2(%) of 12 sites surveyed have litigation challenges.
- 2 of 50 people interviewed complained about low rent paid to landlords and 2(%) of 12 sites where survey was conducted have land litigation challenges.
- 1 of 50 interviewees spoke about lack of access road in some communities as a result of leaner settlement which bloc vehicular movement within these communities and 1(%) of 12 sites where survey was conducted have challenge with access road.
- 11 of 50 interviewees spoke for rejection of tower project in their communities and 4(%) of 12 sites surveyed have the project rejected at the first time due to perception of health hazard and other challenges.
- 2 of 50 interviewees complained about neighbours demanding payment for being close to telecom towers and 2(%) of 12 sites where survey was conducted neighbours demanding compensation for being close to towers.

3.4 Data Processing

Reception of data technique used to process the collected data for this research by grouping data according to views of responses from interviewees. The people who complained about health hazard put together, people who complains about the fear of falling of the towers are also put together and more.

3.5 Data Presentation

Table graphs used for the presentation to explain the value of each category of samples and findings. The problems of the key stakeholders is plotted against the number of responses in one graph and Technical Site Survey Report (impact levels) also plotted against the problems of key stakeholders in second graph simultaneously.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of data obtained from study samples, presentation and discussion of the study findings.

Findings and results for objectives are as follows:

1. To identify the key stakeholders
2. To identify the problems of key stakeholders
3. To analyze the problems of the key stakeholders and pickup solution to their problems
4. To propose measures to improve upon the challenges.

4.2 The Key Stakeholders Involved in Telecom Tower Construction Project are as Follows:

1. Telecom Tower Construction and Managed Services Companies. The companies who build the telecom infrastructure to support the antennae and microwaves and also accommodate the radio base stations, power generator and rectifier cabinets on the cell sites.
2. Site Acquisition Companies/Agents: The agents who take responsibility for acquiring landed properties for the infrastructure companies to construct the mast by visiting the landlords and neighbours, conduct neighbourhood consultation and discuss land rent with prospective landlord with a fee.
3. Telecom Network Provider: Are the major stake holders who formally instruct telecom infrastructure companies by providing them with coordinates to search and

build the cell site on their behalf. Examples are MTN, AirtelTigo, Vodafone, Glo and etc.

4. Ghana Atomic Energy Commission (GAEC): The Stakeholder in charge of Non Ionising Radiation Protection Safety Assessment of RF Base Stations
5. Environmental Protection Agency (EPA): Stakeholder responsible for the protection of the environment including the landlord, neighbours and the general public from any health hazard of the telecom tower and equipment installed on the cell site. They work in collaboration with GAEC to issue EPA permit to the Telecom Infrastructure Companies.
6. Town and Country Planning Departments: They ensure the mast is built according to the country's development plan and building regulations are followed they issue building permit after careful study of the tower building plan and Telecom Infrastructure Company satisfied all necessary payments.
7. Ghana Fire Service (GFS): They issue fire permit after careful study of the building plan to ensure that the location of the cell site is accessible and firefighting rules are followed to permit Ghana Fire Service to carry out their duties effectively in case of fire outbreak.
8. National Communication Authority (NCA): They provide guidelines for the deployment of Telecommunication Mast in Ghana for all Telecom Infrastructure Companies to follow when deploying their Telecom Masts.
9. Ghana Civil Aviation Authority (GCAA): Authority in charge of Civil Aviation permit they also study the proposed building plan provided by Telecom Infrastructure companies to ensure that the location and height of propose mast is within the

permissible height of the GCAA and finally issue permit to what effect if all the requirement are met.

10. Landlords/Landladies: The person who provide their landed property either for a lease or as a donation for the construction of telecom masts.
11. The Neighbours: People who have their residence or landed property close or share boundary with the telecom mast.
12. The General Public: Any person who is positively or negatively affected by the telecommunication mast.

4.2.1 Stakeholders Requirements

To provide every community in Ghana with good telecommunication network to improve both development and personal life of the people.

To build health hazard free cell sites in all communities.?

To ensure Ghana Government guidelines for deployment of telecommunication towers are followed by tower mast construction companies.

To ensure the consent of the community should not be undermined by telecom network providers.

Effective neighbourhood consultation should be done and neighbourhood consent should be paramount.

Cell sites should be managed effectively to avoid complains by neighbours and landlords/landladies about generator noise.

4.2.2 Identification of Key Stakeholders

The key stakeholders of mobile phone telecommunication mast in Ghana were identified through consultation with Site Acquisition Managers for Helios Tower Ghana Managed Services Limited (HTG) and the study of Government of Ghana Approved Guidelines for the Deployment of Telecom Towers 2010 Edition. Site Acquisition Manager provides the names of key stakeholders of HTG managed Services Ltd as follows:

(i) Staff of HTG including directors of the company, (ii) sales manager and his team, (iii) site acquisition manager and his team, (iv) project manager and her team, (v) procurement manager and her team, (vi)financial controller and his team, (vii) human resource manager and her team, (Viii) fleet manager and her team, and (ix) drivers of the company.

Second group of stakeholders are: (i) National Communications Authority (NCA), (ii) Metropolitan, Municipal and District Assemblies (MMDAs), (iii) Environmental Protection Authority (EPA), (iv) Ghana Fire Services (GFS), (v) Ghana Civil Aviation Authority (GCAA), (vi) Ghana Atomic Energy Commission (GAEC), (vii) Network operators, (viii) Landlords and Landladies of the various telecom Cell Sites, (ix) immediate neighbours who share common boundary with the cell sites and users of mobile phones. These groups of people were identified. Table 1 below shows detail stakeholder register to explain the Identity, Names, Roles, Location, Expectations, Impact, Power, Influence, Interest and Classifications of stakeholders in mobile telecommunication mast construction works.

Table 4.1: Stakeholders Register

DETAILS OF KEY STAKEHOLDERS IN MOBIE TELECOMMUNICATION MAST CONSTRUCTION COMPANY								
ID	Name	Role	Contact Details	Location	Expectations	Impact/Power/Influence	Interest	Classification
SN01	Site acquisition agents	Acquire land from landlords, Sign agreement with landlords on behalf of HTG, acquire various building permits on behalf of HTG for the construction works		Accra	Acquire property for the construction of tower without neighbourhood challenge	L	H	Agent
SN02	Telecom network Provider (MTN)	Provide network services		Accra	To provide network for people to communicate and pay for the airtime	M	H	Network service provider
SN03	Telecom tower construction and managed services company (HTG)	Undertake cell site construction works		Accra	To build telecom cell site and rent it to network providers	M	H	Construction and managed service Provider
SN04	Ghana Atomic Energy Commission	Issue RPI permit		Accra	Requirements are met for the issue of RPI permit	H	M	Permitting authority

SN05	Environmental Protection Agency	Provide EPA permit		Regions	Requirements are met for the Issue of EPA permit	H	M	Permitting authority
SN06	Town and Country Planning Departments	Building permit		Regions	Requirements are met for the issue of building permit	H	M	Permitting authority
SN07	Ghana Fire Service	Fire permit		Regions	Requirements are met for the issue of fire permit	H	M	Permitting authority
SN08	National Communication Authority	Guidelines for deployment of Telecom Towers		Accra	Guidelines are followed when deploying Cell sites	H	M	Government
SN09	Ghana Civil Aviation Authority	Aviation permit		Accra	Towers not build in flight zones	H	L	Permitting authority
SN10	landlords/landladies	Grant a piece of land for the construction of Cell sites		Cities, towns and villages	Rent out their property for financial income	M	M	Property owner
SN11	The neighbours	Sign neighbourhood consent forms		Close to cell site locations	Telecom tower did not give the health hazard	L	L	Neighbour
SN12	The general public	The users of network services		Where network service available	Telecom network is available for them to communicate with friends and relatives	L	H	Service User
SN13	HTG SAQ Manager	SAQ Manager		HTG, Accra	To acquired property for the construction of telecom towers	H	H	Construction and managed service provider

SN14	Mibram SAQ Manager	SAQ Manager, Mibram		Mibram Consult, Accra	To acquired property for the construction of telecom towers	M	H	Agent
SN15	Klems SAQ Manager Saku	SAQ Manager		Klems Consult, Accra	To acquired property for the construction of telecom towers	M	H	Agent
SN17	Klems SAQ Agent	SAQ Manager, Klems Consult		Klems Consult, Accra	To acquired property for the construction of telecom towers	M	H	Agent
SN18	State ans Survey Consult Manager	SAQ Manager, Estate Consult		Estate and Survey Consult	To acquired property for the construction of telecom towers	M	H	Agent
SN19	SAQ Agent Netis	Operations Manager		Netis Ghana Limited	Maintenance and services company	M	H	Construction and managed service provider

4.3 The Challenges of the Key Stakeholders.

The challenges of some key stakeholders were identified through this researcher's interview of EPA Senior Manager, GAEC Senior Manager, Site Acquisition Manager HTG, Site Acquisition Manager Klems Consult, Site Acquisition Manager Mibram Consult, Site Acquisition Manager Estate and Survey Consult, Landlords and Landladies of some selected Cell Sites.

4.3.1 Neighbourhood Consultation Form for EPA

Neighbourhood consultation is stakeholder management process used in telecommunication tower construction project to inform and manage people residing close to tower project site within 120m radius. Neighbours are provided with consultation forms and allowed a time to study the requirements on the form and complete the form and handover to SAQ manager through SAQ agent available to coordinate site acquisition.

4.3.1.1 Site Assessment by Operations and Maintenance Team.

HTG maintenance team periodically visit sites as one of the major stakeholder duties to assess the status of the sites and check the following items on site:

1. Warning signage at the site gate indicating that only authorized people with permission from HTG Network Operation Centre (NOC) can enter cell sites.
2. Availability of gate electronic Acsys lock which can only be opened at NOC for the visitors with time allowed, to stay on the site.
3. Available fence and gate to prevent unauthorized person from entering the site to cause damage to equipment installed.

4. Available generator and fuel tank on site as second source of power on site and ensure periodic service of the generator.
5. Available fire extinguisher and its service check list.
6. Compound light working
7. Aviation warning light available and functioning.
8. Check Environmental Health and Safety (EHS) signage present on site to direct visitor away from equipment with high radiation emission.
9. Security available on site 24hrs to report any unusual event on site.
10. Checking visible corrosion on tower for early treatment of corrosion which can result into falling of the tower.

Cell site assessment visit is carried out quarterly to ensure safety of the landlord, neighbours, and citizens in the community and the tower in position.

Find attached assessment form for “boot not suit” site visit in appendix 1.

4.4 The challenges of key stakeholders identified as follows:

- Tower strength (Fear of tower falling on the Landlord and neighbours at the reach of the tower).
- Perception of health hazard in the mind of the public.
- Demand for insurance policy cover from telecom companies
- Lack of education about the deployment of telecom towers for the public.
- Litigation between the landlord and other property owners
- Low rent paid to landlords

- Lack of access in some communities as a result of indecorous settlement which block vehicular movement to proposed sites.
- Rejection of tower projects by the communities/neighbours.
- Neighbours demanding payment for being close to the telecom tower

4.5 Analyze the challenges of the key stakeholders and propose measures to improve the challenges.

Government of Ghana Guidelines for deployment of communication towers provided solution to some of the problems as stated above:

4.5.1 Tower Strength

Inspection of Tower Structures Stated. Permitting authorities should inspect proposed sites for tower construction before and after tower construction works to ensure safety of the neighbours and the entire environment. Structural integrity assessment shall be conducted on the tower every year to ensure safety of the tower and the public (Guidelines on communication towers 2010). The interview conducted revealed that permitting authorities do not visit and inspect proposed sites before the award of the permits to tower construction companies.

4.5.2 Issue of Some Communities Did Not Accept Telecom Towers.

It is stated in Government of Ghana guidelines for deployment of communication towers that the solutions identified for some problems of key stakeholders are as follows:

"Evidence of neighbourhood (adjoining structures) consultation conducted in the immediate area where the tower is to be mounted, as per the Standard Consultation. The evidence may be certified by the assembly member in charge of the area". "The Geo – Technical Investigation Report should be certified by a Geo- technical Engineer".

The respondents revealed that towers were built in most communities without the knowledge of the assembly members and the chiefs in charge of these areas. The site acquisition agents in charge of these areas went secretly to the landlords and acquire lands for the project without the knowledge of the opinion leaders in the area.

4.5.3 Perception of Health Hazard

Perception of health Hazard in the mind of the public: The application form for RPI permit clearly state that a person who intends to construct a communication tower shall obtain a permit from the RPI to ensure that the public, workers and the environment are protected from any harmful effect of radiation and all applicants should notify RPI with application form completed with microwave and antennae details and submit to GAEC. An Applicant shall notify the RPI of its intention to install an antenna by submitting a completed RPI form for non-ionising radiation either in hardcopy or softcopy depending on the local area's requirements. The applicant shall also provide all the relevant technical information to enable RPI carry out a safety assessment of the antenna. In the interview conducted the Interviewees informed the researcher that landlords and neighbours were not contacted by RPI for any assessment towards the construction of telecommunication mast in their area and no single person among them have not been given any form of protection.

4.5.4 Demand for Life Insurance Policy Cover

Demand for life insurance policy cover from telecom companies by landlords and neighbours "Evidence of accident insurance policy in the Guidelines on Communications Towers in 2010" by Government of Ghana. Through the interview of some stakeholders it was discovered that landlords and neighbours are not covered with life insurance policy by telecom network providers and falling of Glo tower in Takoradi Market Circle in 2017 was quoted as an example, no benefit was provided for the victim's family

4.5.5 Lack of Education

Lack of education about the deployment of telecom towers for the public. No education provided to the public by NCA for the deployment of telephone towers in communities which leads to neighbours and communities agitation about massive deployment of telecom towers in the country by network providers. (Guidelines on communication towers, 2010). This challenge can easily be improved by proving adequate education for key stakeholders like landlords, neighbours and general public about the deployment of telecommunication mast including rooftop and green field towers in the country.

4.5.6 Litigation between the landlord and other property owners

Litigation between the landlords and other property owners, in the MMDAs requirements for permits stated that "evidence of ownership of the property and/or the property on which the structure is to be installed a written consent of the owner and evidence of neighbourhood (adjoining structures) consultation conducted in the immediate area where the tower is to be mounted, as per the standard consultation". These evidence may be certified by the Assembly

Member in charge of the area". (Government of Ghana Guidelines for the deployment of telecom Mast 2010).

It was revealed to the researcher through interview of stakeholders that most of the sites were acquired and masts constructed without the knowledge of the Assembly Members in charge of these areas because of the financial interest held by the landlords.

4.5.7 Some neighbours did not accept the construction of telecom towers in their communities.

"The evidence of neighbourhood (adjoining structures) consultation conducted in the immediate area where the tower is to be mounted, as per the standard consultation, the evidence may be certified by the Assembly Member in charge of the area". (Guidelines on communication towers 2010).

Some of the assemblymen confirmed that neither site acquisition managers nor landlords never consulted them for the construction works they only saw towers springing up in their communities without their knowledge of the infrastructure company or the network provider in charge of these projects.

The challenges of the key stakeholders and their impact level is in graph below. Impact Level: 1- Very low, 2 – Low, 3 - Medium, 4 – High, 5 – Very High. The challenges of key stakeholders plotted against the total numbers of response and impact levels plotted against challenges of key stakeholders simultaneously to analyse challenges and their impact level on telecommunication mast construction project in Ghana.

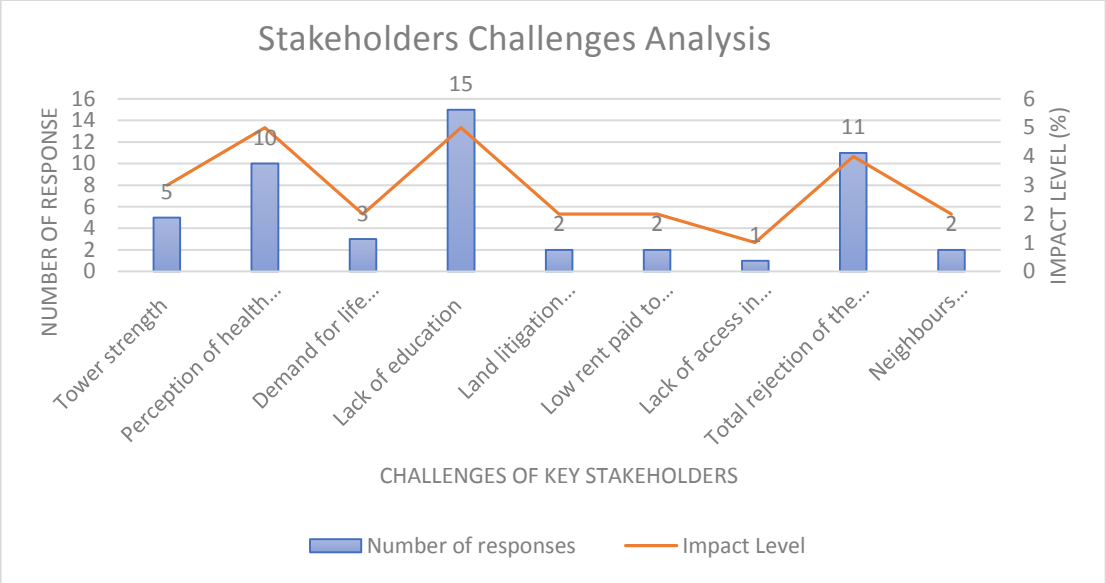

Figure 4.1: Challenges of Key Stakeholders Analysed (PMI, PMBOK 5, 2013) pp.396-397

4.6 Findings

The findings from the interviews and analysis refer to the challenges and their impact levels. The interview conducted revealed that the challenges of rejection of telecom mast project by some neighbours and communities came as result of the following:

A. "Lack of education for stakeholders about the deployment of telecom mast was 15 of 50 and the impact level is very high on telecommunication mast construction project".

B. "Perception of health hazard in the mind of the public was 10 of 50 responses and the impact level is very high".

C. "Rejection of the telecom mast project by the neighbours was 11 of 50 responses and impact level is high".

D. “Tower strength (Fear for falling of the mast on the landlords and neighbours at the reach of the mast responses) was 5 of 50 responses and the impact level is medium”.

E. “Demand for life insurance policy cover from telecom companies was 3 of 50 responses and the impact level is low”.

F. “Litigation between the landlord and other property owners was 2 of 50 responses and impact level is low”.

G. “Neighbours demanding payment for being close to the telecom tower was 2 of 50 responses and impact level is low”.

H. “Lack of access in some communities was 1 of 50 responses and the impact level is very lows”.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusion of the study and recommendations drawn from the research in relation to the findings of the study as well as appropriate suggestions for future researches.

5.2 Findings

1. Lack of education for stakeholders about the deployment of telecom mast the response was 15 of 50 and the impact level is very high on telecommunication mast construction project.
2. Perception of health hazard in the mind of the public was 10 of 50 responses and the impact level is very high.
3. Rejection of the telecom mast project by the neighbours was 11 of 50 responses and impact level is high.
4. Tower strength (Fear for falling of the mast on the landlords and neighbours at the reach of the mast responses) was 5 of 50 responses and the impact level is medium.
5. Demand for life insurance policy cover from telecom companies was 3 of 50 responses and the impact level is low.
6. Litigation between the landlord and other property owners was 2 of 50 responses and impact level is low.
7. Neighbours demanding payment for being close to the telecom tower was 2 of 50 responses and impact level is low.

8. Lack of access in some communities was 1 of 50 responses and the impact level is very lows.

5.3 Conclusion

The researcher concludes that: The challenges associated with construction of telecom mast in Ghana are caused by some the following factors:

1. "Lack of education for the public about the deployment of telecom mast in Ghana by Government of Ghana and Telecommunication Network Providers that makes it difficult for the neighbours and the public to accept the construction of the mast within their areas".
2. The speculation of "Perception of health hazard" gone down in the minds of the general public that is one of the major reasons why some communities and neighbours denied the construction of telecommunication mast project within their environments.
3. "Fear for the falling of the telecommunication mast on people or properties at the reach of the mast" is highly considered by neighbours and other people in the communities and examples are Dawenya near Tema and Achiaman in Amasaman Municipals.
4. The analysis and findings revealed that large number of people rejected the construction of telecommunication mast in their communities for various reasons stated in the findings above. However mobile telecommunication is one of the pillars of development of a nation and is wide spread in all developing countries including Ghana.
5. Demand for insurance policy cover from telecom companies is one critical concern of landlords and neighbours which needs immediate attention to address insurance

challenges for both landlords and neighbours Glo telecom's mast incident in Takoradi Market in 2017 where one person loss his life was cited as an example no benefit was paid to the families of the victim. The researcher conclude that NCA should enforce it on telecommunication network providers to prepare insurance package for all landlords and neighbours close to the mast because life of the person in more importance and value more than all other things.

6. Litigation between the landlords and other property owners delays project when it occurred and finally resulted to financial lost to the telecom mast construction companies if not handled carefully. The researcher therefore concluded that land litigation issues should be kept minimum between property owners in the telecommunication mast construction projects.

5.4 Recommendations

Recommendations drawn from the research in relation to the findings of the study as well as appropriate practical and future recommendations.

5.4.1 Practical Recommendations

1. Intensive education should be carried out by Government of Ghana and Mobile Phone Telecommunication Companies through public forums, radio and television massages to educate the public about the deployment of telecom mast in Ghana.
2. The NCA should make copies of Government of Ghana Guidelines for Deployment of Telecom Mast available in all schools, public libraries and other public places to educate the public about telecommunication mast construction measures to clear the speculations of health hazard in the minds of the public.

3. Landlords and direct neighbours should be covered with insurance policy as stated in (Government of Ghana guidelines for deployment of telecommunication towers 2010) to bolster landlords and neighbours in case of accident.
4. Site acquisition managers should do thorough search through Chiefs and Land Valuation Departments to identify legitimate landlords and deal with them only to avoid litigation between the selected landlords and other property owners
5. Regular inspections should be carried out on telecom towers by NCA and permitting authorities to ensure effective maintenance on the towers, power and transmission equipment on cell sites to ensure safety of the public.
6. Government of Ghana Guidelines for Deployment of telecom towers should be strictly adhered by tower construction companies "Tower should be constructed 20m away from residential accommodations and 150m from schools, hospitals and markets" without compromise.

5.5 Limitations of the Study

Limitations of this study include the inability to cover a wider area of relatively more communities and stakeholders where telecom towers are constructed in Ghana. This limitation was inadvertently unfeasible to embark on due to time and cost constraints. As a result, the study was narrowed down to some purposively selected stakeholders from whom primary data was obtained. This also posed a limitation since there could be some biases regarding the information obtained. In dealing with this limitation, interviewers guided respondents to reduce their personal perceptions and assuring confidentiality. As a significant procedure to

the study limitations, resources were cautiously administered and managed in order to achieve the objectives of the study conveniently.

5.6 Recommendation for future studies

The researcher finally recommended that any future research can perhaps look into the impact of telecom mast construction in Ghana on the health and safety conditions of residents at where these towers are installed.

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Appendix 1

1.1 Interview of Key Stakeholders

Interview of a chief in the Volta Region.

- **Togbe**: Were you consulted by the Site Acquisition (SAQ) agent for the construction of the cell site in your town?
- **Answer**: Yes
- **Togbe**: In your capacity as the chief and opinion leader did you meet your people to discuss the bringing of this project in to your community?
- **Answer**: Yes. A meeting was held with other opinion leaders like the Assembly Man, and Odikro to brief them about the proposed project. Another meeting was held with both the residents of the whole town to inform them about the project.
- **Togbe**: Did any person in your community complain about the negative effect of project?
- **Answer**: No.
- **Togbe**: Did the landlord by any reason kick against the construction of the site on his/her land?
- **Answer**: No.
- **Togbe**: Is there any person in Togbe: Is there any person in your community who disagreed with the construction of the telecom tower in your community?
- **Answer**: No.
- **Togbe**: Were you contacted by the representatives of EPA and District Assembly for any reason concerning the construction of the telecom site?
- **Answer**: Yes.

- The chief informed the researcher that the community is happy about the project because it will help them to communicate with their relatives who are in Accra Kumasi, Ho, Koforidua, Takoradi and other places at any time.
- The chief also informed the researcher that he hoped the available MTN network in the town will open more business opportunities for youth who want to setup MTN money transfer business.
- The chief commended Helios Towers Ghana Managed Services Limited (HTG) and MTN for bringing Network to them. Men and women who have relatives working in the cities find it difficult to send money to their parents because no bank or money transfer center is in the township and this project will provide them with financial relief.
- The chief thanked Helios Tower Ghana Managed Services Limited and MTN for choosing the town to build telecom cell site to provide the people of the town with network.

1.2 Interview of SAQ Manager on 31st July 2018 in Accra. SAQ Manager told the researcher that he acquired a number of sites for Helios Ghana Managed Services Limited in 2012 to build towers in Accra, Eastern and Volta Regions and he had challenges with both landlords and the neighbours. However, he resolved them but some of them finally ended in court. Currently he had challenge with some of the selected candidates in Liati Agbonyira in the Volta region against the prospective landlord because their lands were not approved by MTN for the construction of the cell site.

The other sites with challenge issues are Akplabanyan in Tema East, Community 25 in Tema, Dawenya/Comm.25 in Dawenya and Sakumonor near Tema community 3. The neighbours kicked against the project with the various reasons like health hazard, fear of tower falling and land litigations among the landlords.

In Accra, Kumasi and Tema the neighbours complained about the health hazard of the telecom site on surrounding neighbors specially children.

One other challenge the SAQ manager raised was the poor layout which makes it difficult to acquire land space in cities and towns. In Sakumonor and Dawenya buildings were scattered indiscriminately which made it difficult to achieve (National Communication Authority) NCA guide lines.

The issue identified generally is the perception in the mind of some people that the telecom towers have health hazards for people or they may fall and kill people. This wide spread belief makes it difficult for owners to give out land for building of towers for the community. It takes site acquisition teams more time to educate these people and sometimes provide them with NCA guidelines for deployment of telecom towers 2010 before they accept the tower project on their lands.

He also disclosed to the researcher that the complaint made by some neighbours about the noise level and smoke produced by telecom site generators to pollute their environment which is also another health hazard to them and their children.

The SAQ manager finally informed the researcher that he does more education of both land lords and the neighbours in order to get their consent to accept the construction of towers in their communities. The towers help the communities in diverse ways to develop and provide business opportunities to people in the community.

1.3 Interview of Assemblyman in Volta Region on 1st August 2018, and he disclosed to the researcher that he has encountered two major challenges with the siting of telecom tower in the town. These are:

1. Neighbours demanding payment for being close to the telecom tower.

2. Direct and indirect neighbours complaining of health hazard.

3. Neighbours and Landlords demanded to be covered with Life Insurance policy.

The neighbors who share boundary with the cell site came to him demanding compensation to be paid to them because they were told that people who share boundaries with telecom site are paid some money and he answered them that he had no idea but would find out from SAQ manager.

In the case of health hazard he told the researcher that information from SAQ agent specified 20metrs from the tower is approved by NCA and that residents can stay without fear.

Finally the chief assisted in resolving the issue of litigation raised by neighbours.

1.4 Interview of SAQ Manager for Estate and Survey Consult on 30th July 2018. He told the researcher that during his contact with landlords and neighbours in Accra metropolis some people complained about falling of telecom towers and cited Glo Telecom in Takoradi as an example. Others also complained about the health hazard as major worry to most of them. The prosperous land lords have never complained about the towers because they are always concerned about money they are going to receive from telecom companies

He also added that he always worked within the guidelines of NCA to protect both telecom companies and the public which made it easy for him to acquire sites without challenges in Accra and other regions.

1.5 Interview of Landlord who spoke in Ga. He said since telecom tower was erected in his premises, known and unknown people have been coming to him including his neighbours to complain about the health hazard of the tower on humans but they did not have any clear evidence to prove it. So he told them to go to court to challenge the HTG and MTN to come and decommission the tower and the equipment because he has no proof of health hazard about the tower on his land. He told the researcher that HTG site Acquisition agent gave to him a copy of Ghana Government approved guidelines for deployment of Telecom tower which was his weapon to turn off most people. He often told them to go to National communication Authority (NCA) to find out.

He suggested to the researcher that education of the public should be more intensive because speculation of health hazard has spread all over the country.

1.6 Interview of landlord in Kumasi he declined to speak to the researcher without giving any reason.

1.7 Interview of Site Acqusition Manager. He said when SAQ team reached Danfa near Ketasi on Accra Dodowa road, the whole community came out to protest against the project with the fear that telecom tower has health hazard on humans. A woman she named; Madam Mahamatu a native of Wa in Upper West Region, stood firmly and organized the whole community to kick against the project claiming she was told by her sister living in United Kingdom about the health hazard of telecom tower. So she never permitted SAQ team to explain or educate the community about telecom cell sites. Effort was made to contact the chief of the town but

unfortunately they have no chief and the Assemblyman also lives in Ayimensah, few kilometers away from Danfa Township and has no effective control of the people in the town. In Achiaman New Jerusalem, a community in Amasaman District in Accra the story was not different. The people kicked against the construction of the telecom tower in the area with the view that it has health hazards on humans. All attempts made by EPA to educate them proved futile.

1.8 Interview of landlord in Kumasi Metropolis

In an interview with a Landlord from Adwumam (Tano) in Kumasi Metropolis whose identity is withheld for security reasons he told the researcher that his property was acquired by Helios Towers Ghana Managed Services Limited for the construction of telecom tower and all permits were acquired from permit authorities but his neighbour whose property is over 25meters away from the site seriously protested against the construction of the tower. He further went to court to stop the project. The court stopped the project because the landlord had land litigation with the neighbour when they came to the place in early 1990.

1.9 Interview of Landlady of Tamale Bomayago in Tamale Metropolis on 8th August 2018.

She spoke in English and confirmed to the researcher that when the cell site was built in February 2017 the community was very happy about the network but some few months later people started coming to her complaining about the health hazard of towers and people kept on coming day in day out with the same complain. She requested HTG should come to her community to educate people about the effects of telecom towers because she is now being victimized in the community for granting her piece of land for the construction of the tower.

1.10 Interview of chief in Kumasi Metropolis on 8th August 2018. He spoke in English and confirmed that since the tower was built in November 2016, persons from the community or outside of the community have approached him to complain about the health hazard of the telecom tower. One thing he noticed was that the tower is sited far over 30meters from every property in the area. In addition Nana Akwaboah educated the community about the necessity of the tower in developing a community like Prabon. He admitted that the presence of the MTN network in their community will open more business opportunities for the youth and mobile telecommunication has improved in both the community and other parts of the world. He therefore thanked the MTN and HTG for providing them with the network.

1.11 An interview of landlord of HTG Cell Site in Enyan Miam in Central Region.

He spoke in English; and told the researcher that people of Enyan Miam welcome the telecom tower project without complain because the tower is cited far from the town. They rather appreciated the effort of the opinion leader for bringing the communication network to their door step. Formerly they travelled to Makessim to make calls but now they are making mobile phone calls in their rooms. Further more mobile telecommunication businesses are improving in the town for the youth who cannot travel to Cape Coast or Accra to look for job. His emphasized that now he appreciates mobile telecommunication because he comfortably discussed issues with his son in United State of America (USA) without people hearing their conversation.

Mr. Amoah further requested that Vodafone and Airteltigo should come and install their Microwave antennae on the tower to provide them with their network for the benefit of people having these sim cards.

The researcher assured him of conveying his massage to Voadfone and Airteltigo for consideration during their next collocation projects.

1.12 An interview of Chief in Volta Region. He first gave thanks to God; HTG; MTN; Hon. MP of the area, Mr. Kledin Isaac Assemblyman for the area and the project team. For their efforts to bring telecom network to them in Nabu. He never thought of it but it came as an astonishment. No issue of health hazard was raised against the project. He has rather lifted up burdens on them. Formerly they did not count themselves as Ghanaians but now they are connected to Ghana and other parts of the world. They no longer walk over 3kilometers to Togo just to make telephone call to their relatives in Ghana. The chief made a request that mobile phones should be provided to them at reduced prices.

1.13 An interview of landlord for HTG Cell Site at Akyem Akrofufu in Eastern Region.
He spoke in English and told the researcher that no person approached him on the issue of health hazard since the tower was erected. He was very happy about the research work though he has no peculiar case but speculations of health Hazard by Telecom Cell Site (Tower) had reached him but he had no one to ask for confirmation. He commended HTG for regular servicing of the generator and other equipment on the site to maintain sound level of the generator very low.

1.14 An interview of landlady for HTG site at Achinakrom. She spoke in Twi and told the researcher that, she did not encounter any challenge from her neighbours but Pentecost Church which is situated about 150meters away were the only people who complained about the

falling of the tower so she wanted to know from the researcher the strength of the tower to the wind load. Researcher directed her to the structural engineer in charge of HTG towers for the structural details and assured her it will not fall easily. The landlady lamented about absent of insurance policy to cover her and close neighbours, free airtime and extension of generator power to her house which HTG promised but failed to provide were her challenges.

1.15 In an interview of a landlady for HTG Cell Site at Akyem Herman in Eastern Region.

He spoke in Twi and told the researcher that no person approached her on the issue of health hazards since the tower was erected. She was very happy about the research work though she had no peculiar case but speculations of health Hazard by telecom Cell Site (tower) had reached her years now but she has no confirmation about it. She commended HTG for regular servicing of the generator and other equipment on the site to maintain sound level of the generator very low

1.16 An interview of landlady for HTG site at Kokobeng in Kumasi contacted on phone on 13th August 2018.

She spoke in Twi and told the researcher that two of her neighbours and the Chief of the community were against the building of the tower her property at the beginning of the project with no reason but the situation had changed. The researcher asked her of any complain about health hazards or falling of the tower from direct neighbours or any person in the community? She answered no, and said, no landed property was closed to the cell site. However the community was informed about the safe distance to other properties. She told the researcher

that her only challenge was the noise from the site generator during commercial power outage. She request something to be done about it for her.

1.17 An interview of landlord on 13th August 2018. Revealed to the researcher that he encounter challenges in all site acquisitions done in Accra, Kumasi, Tema and Takoradi among others. The main issues raised were health hazard, tower strength, absence of insurance policy covering landlords and close neighbours, lack of education to the public about telecom tower and low ground rent paid to landlords and litigation among property owners.

The researcher asked him about the sites he failed to acquire for the tower construction project for HTG based on the above challenges. He mentioned places like Pantang Hospital, Achiaman, Amasaman, Oyarifa Gravel Pit, Ashalley-Botsoe Sakumonor, Ayalolo, Haatso Rabbit, Taifa, East Legon. Cantonment and East Airport among many others in the Accra Metroplolis. The researcher asked whether they had organized any educational forum for the landlords and neighbours to educate them about the deployment of telecom towers in these communities. He answered no and added site acquisition consultants like him could do it alone without telecom companies and NCA because it needed both human and financial resources to educate the public through forums and Radio announcements.

The researcher asked him whether by any chance he mentioned it to the telecom companies to contribute to educate the general public about the deployment of towers. He said, he had mention it several times in their meetings but it did not yield any fruitful results.

When the researcher asked whether he discussed it with his client HTG. The answer was the same, he told the researcher that NCA guidelines for the deployment of telecom towers was published since 2010 no review or update had been done to it up-to-date. In his point of view

the major challenge in the industry is the citizens of this country have no idea about telecom tower deployment in the country. They only saw rigger erecting lattice or monopole tower in their communities without being informed about it. Meanwhile they were also the stakeholders of these towers who would be affected either positively or negatively.

When asked whether he had challenged with permitting authorities during acquisition of building permits for the construction of HTG towers. He answered in the affirmative and added that EPA sometimes denied him permit for some sites due to reports from neighbourhood consultation. If EPA was satisfied with the site location and neighbourhood consent report acquiring permit become very easy because other authorities like Metropolitan, Municipal and District Assemblies (MMDAs), Ghana Fire Services (GFS), Ghana Civil Aviation Authority (GCAA), Ghana Atomic Energy Commission (GAEC) will only check tower height, access to the site, fire suppression system microwave and antennae details to approve for permit.

SAQ Manager finally told the researcher that resolving the above challenges and educating the public very well about deployment of telecom towers in the country would remove if not all most of the challenges in site acquisition for the deployment of telecom towers in the country.

1.18 In an interview of another landlord for HTG site at Ajumako Bar. Who spoke in Twi he told the researcher that, he did not encounter any challenge from his neighbours but a fitting shop which was situated about 130meters west were the only people who complained about the falling of the tower so he wanted to know from the researcher the strength of the tower whether it could fall on people or property as assumed by the fitters. The researcher directed

him to the structural engineer in charge of HTG towers for the structural details and assured him none of HTG towers had fallen down so it would not fall easily. The landlord lamented about absence of insurance policy to cover him, free airtime and extension of generator power to his house which HTG engineers promised him but failed to provide were his challenges.

1.19 Interview of another chief in the Volta Region who spoke in English and confirmed that the entire community was happy about the tower project because no network was in the town. He said this was a golden opportunity for Tsyome Sabadu to get connected to Ghana and the rest of the world. He said, the presence of the MTN network in their community would open more business opportunities for the youth and mobile telecommunication has improved lives in most communities. He therefore thanked the MTN and HTG for providing them with the network.

1.20 An interview of landlady for HTG site at Kpando who spoke in Ewe told the researcher that, she did encounter challenges from her neighbours and the public about the presence of the telecom tower on her property. Most people complained about health hazard and other issues including neighbours verbal assault that she was the one causing them to fall sick so the tower should be removed from the place. The researcher told her to direct neighbours who usually lunched attack on her to EPA or the structural engineer in charge of HTG towers for the structural details and assured her it would not fall easily. The landlady lamented about low rent paid to her by Tigo/HTG that she had been cheated and compared her land rent to ATC tower on similar size of land.

Appendix 2

2.2 Quality Assurance Engineering Analysis

Technical Site Survey form below provide the detail survey work usually carried out by quality assurance engineering team including site acquisition manager of delegate from SAQ department, landlord and geodetic engineer to facilitate the site acquisition process. During the Technical Site Survey (TSS) SAQ manager ensure that all neighbours are contacted to complete neighbourhood assessment forms and signed to agree or disagree with the tower project. QA engineer takes all offset measurements from the tower location to nearby structures to ensure that no structure is with 20m radius of proposed tower to conform to NCA guidelines for the deployment of telecom towers. The present of landlord and neighbours in TSS ensure that boundaries of the land acquired will be well defined to avoid land litigation during construction stage of the tower project.