

*Master's Thesis*  
*Computer Science*  
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# **EXPLORING COMPUTERIZED TROUBLE TICKETING SYSTEM AND ITS BENEFITS IN VODAFONE GHANA**

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## **ABSTRACT**

Today more than ever, Computerized Trouble Ticketing System is becoming a booming information technology system that makes the difference between staying in business in a competitive global telecommunication arena.

This quantitative exploratory survey utilised conveniently selected research subjects to explore computerized trouble ticketing system and its inherent benefits in Vodafone Ghana Plc. Cross section of vital data set collected with the aid of structured questionnaires haven been analyzed using descriptive statistics model.

The study revealed that, effective and efficient usage of computerized trouble ticketing systems benefit the company in terms of its customer satisfaction, competitive advantage and business intelligence in competitive telecom arena. Nevertheless, the smooth realization of these inherent benefits are constantly challenged by complexity in managing volumes of data generated, intense era of competition, high cost of trouble ticketing system, as well as, rapid technological obsolesce in computerized trouble ticketing applications in telecommunication market.

The study recommended for the quick and effective adoption of differentiation strategy, cost leadership strategy and customer relationship management, which are customer-centric measures that can build sustainable long-term customer relationship that can create value for the company, as well as, for the customers.

Keywords: Computerized Trouble-Ticketing, Vodafone, Ghana

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# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the study

Today, more than ever, computerized information system technologies are so much a part of our lives that people almost take them for granted. Thus, in less than 60 years, the world has shifted from industrial-driven society to a knowledge-based economy driven by information (Gitman & McDaniel, 2002).

In many ways, businesses depend on computerized information technology (IT) for everything, from running daily operations to performing extremely complex operations. There is a whole gamut of computerized software programmes available, such as wiki-based helpdesk and heavily featured IT solutions, which can grant functionality on some level (Schmidt, 2014).

These IT oriented solutions allow businesses and organisations to deliver quality goods and services whenever and wherever it is convenient for the customer (Nickels, McHugh & McHugh, 2008). In fact, the manner people do business drastically changes when companies increase their computer-based technological capabilities. Not amazingly, today, businesspeople are faced with “infloglut” or overload of information (Boone & Kurtz, 2006).

To manage this overload of information, firms need technologies that support the exchange of the vital information amongst staff, suppliers, and customers (Nickels *et al.*, 2008; Farese, Kimbrell, & Woloszyk, 2002). Meanwhile, as traffic on the online access increases, the slower the connection becomes. As a result, new technologies are mostly procured by companies to effectively unlock many of the traffic jams experienced in computerized technologies often powered by internet.

The process of creating customer satisfaction and building long-term relationships in corporate world requires a world-class interactive technological-based information system. The goal of leading telecom businesses has therefore been on placing a strong emphasis on improvement on the operations (Gitman & McDaniel, 2002) in an intense competitive global business arena (Boone & Kurtz, 2006).

It is noteworthy that, modern day computers have leaped beyond plain numbers, text and graphs, to encompass interactive media capabilities, including trouble-ticketing systems (TTS). This defines a computer-based software package that manages and maintains lists of issues in corporate business environment (Spolsky, 2002; Home Depot, 2002).

Available studies indicate that, the growth of this technology has been phenomenal (Nickels *et al.*, 2008), such that approximately 500 million people worldwide use it (Cyber Atlas, 2002). Relatively, over half of Americans are said to be users of this technology online, and this percentage is expected to increase to over 70% in the few years (Henricks, 2003).

Contemporary businesses make extensive use of online computerized trouble ticketing systems, in order to gather information about their customers (Nickels *et al.*, 2008).

The heart of managing this information is creation of decision database systems (Boone & Kurtz, 2006), which monitor all components of the business strategy, identifying problems and opportunities.

In turn, this can have impact on the quality of customer service (Agoulmine, Dragan, Gringel, Hall, Rosa, & Tschichholz, 2000; Xie, Ofman & Lawrence, 2004). The crux of the matter is that, the use of the phenomenon of trouble ticketing systems, sometimes called issue tracking system (ITS); support ticketing (ST); or request management system (RMS), has become commonplace within the corporate business environment worldwide (Cell Centre News, 2003).

This is equally true in the Ghanaian corporate business milieu, where there is considerable evidence of increased interest by many organisations within the telecommunication sector to master the utilisation of computerized trouble ticketing systems for enhanced quality assurance or “customer relationship management” (CRM) purposes (Lamb, Hair & McDaniel, 2008). The study therefore explored inherent benefits in the use of Computerized Trouble Ticketing System (CTTS) in Vodafone Ghana Plc.

## **1.2 Statement of the problem**

A cursory look at the operations of VG Plc., reveals that the service provider currently finds it increasing difficult to explore opportunities to provide actual and potential customers with differentiated service level agreements (SLAs), which fulfill the implicit obligations been entered into between the service provider and customers.

Indeed, it is very unfortunate to note that, currently most customers of the company continue to call or walk to the helpdesk of its premises to report issues. In many cases, a specially designed form is filled taking note of the customer’s numbers, location and the specific challenges or problem. It should come as no surprise that, faults are eventually piled up. Faults managers then tend to assign “Trouble Tickets” or “Work Orders” to field engineers, who in turn, attend to complaints of the affected customers. Meanwhile, as customer base grow, the amount of paper works done in a day has become very enormous.

As a consequence, many reported faults are not attended to in an orderly manner, thereby delaying response time. Tracking complaints from customers via the use of TTS are virtually observed not to be very effective, and or nonexistent, let alone resolving issues efficiently.

Some customers tend to report faults multiple times before they are attended to amid frustrations of having to travel long distances, just to make a simple complaint. Further, a painstaking effort to review secondary studies been conducted in this area of research also revealed general studies rather than specific research proposition involving the company.

In consideration of the above noted problems, the study inquired into inherent benefits of the use of computerized trouble ticketing system in Vodafone Ghana.

### **1.3 Objectives of the study**

The study inquired into the use of computerized trouble ticketing system and its inherent benefits in Vodafone Ghana Plc.

#### **1.3.1 Specific objectives**

The study specifically sought to:

- i. Explore the nature of computerized trouble ticketing system in the company,
- ii. Examine the inherent benefits of computerized trouble ticketing system in the company,
- iii. Identify the major challenges that hinder the effective use of computerized trouble ticketing systems in the organisation.

### **1.4 Research questions**

The research propositions proposed and pursued in this research work include the following outlined:

- i. What is the nature of computerized trouble ticketing system in the Vodafone Ghana company?
- ii. What are the inherent benefits in the use of computerized trouble ticketing systems in the telecom company?
- iii. What are the major challenges that hinder the effective use of computerized trouble ticketing system in the organisation?

### **1.5 Significance and justification of the study**

The current study appeared quite significant. This stemmed from the fact that, it tends to provide the following noted benefits: First, it provides a concise understanding of the exact nature of computerized trouble ticketing systems, which is recognized to be one of the fastest growing segments in today's era of intense competitive and rapidly changing interactive corporate telecommunication business environment.

Moreover, it considers in details and subject to an empirical analysis of TTSs, in order to discover the essential features or meaning of it in the context of telecommunication business turf in Ghana and even beyond. Further, it identifies the major challenges that tend to hinder the effective and efficient design and use of computerized trouble ticketing systems, which are nowadays widely used in many companies that are into service provisioning.

Above all, it equips stakeholders in telecom business, such as engineers, managers and customers of Vodafone Ghana Plc., with the requisite know-how to make informed decision and choose course of action with regards to fault reporting, assignment, and troubleshooting via the use of TTSs.

#### **1.5.1 Justification of the study**

In spite of evidence of some studies in this area, the research believes that there are still ample gaps in the existing secondary studies. Noticeably, the study is justified on the grounds that, its denial may countenance the inadequacies inherent in the existing

studies. More so, the inability to conduct the study may deny us of achieving the objectives for which the study has been conducted.

### **1.6 Scope of the study**

The study should have been conducted to cover all the telecommunication companies in the country. However, due to some constraints, such as time and finance, the study mainly delved into the exploration of computerized trouble ticketing system and its inherent benefits in Vodafone Ghana Company.

It principally inquired into important dimensions of trouble ticketing systems in terms of its: exact nature, inherent benefits, and challenges, which majorly tend to thwart the effective and efficient use of this interactive computer-based technology. These issues have been explored from global, continental, national and local perspectives. It is worthy of emphasis that, employees and customers of VGC were the unit of analysis.

### **1.7 Organisation of the study**

The study has been organised into five main intertwined chapters. “Chapter One” was an introductory segment, which detailed basic research themes, including: background; statement of the problem; objectives, research questions; significance, and scope of the study. It concluded with organisation of the study.

The “Chapter Two” outlined the review of some available literature been written by other scholars, researchers and practitioners alike. Key variables that ran through the objectives of the study have been reviewed thematically. The Chapter concluded with a conceptual framework that modeled the pattern of relationship between independent, intervening and dependent variables.

“Chapter Three” presented research methodology used to gather quantitative data set needed to do statistical analysis.

It indicated research methodological themes, such as: research design; population; sample and sampling technique; research instrument; data collection; data analysis; ethical consideration; and profile of the study.

It continued with the “Chapter Four,” which also presented the data result, analysis and discussions of the results.

“Chapter Five” that indicated the summary of findings and recommendations.

It concluded with the “Chapter Six” is indicated to the conclusions and future works.

## **CHAPTER TWO**

# RELATED WORK

## 2.0 Introduction

The chapter presented review of the extant literature regarding the phenomenon of computerized trouble ticketing systems in the context of telecommunication corporate business environment. It is a selection of existing document; both published and unpublished on the research proposition.

It contained information, ideas, data and empirical evidences written from a particular standpoint that fulfills the objectives of the study. Key variables identified have been thematically reviewed. These included: nature of computerized trouble ticketing system; inherent benefits in the use of trouble ticketing systems; and challenges in using TTSs. The chapter concluded with a conceptual framework, which modeled the pattern of relationship between variables.

## 2.1 Nature of computerized trouble ticketing system

Today organisations employ many different types of information systems that are mostly computerized (Rainer, & Cegielski, 2007). These diverse types of support system within organisations include computerized trouble ticketing system. This support system has advanced so quickly that, all businesses, regardless of size, location or industry, now have access to data and information that can make them competitive in a global arena (Boone & Kurtz, 2006).

It has been opined that, these technological advances provide a vast amount of vital information about current and potential markets and to quickly and easily communicate company and product information to current and potential customers (Lamb *et al.*, 2008). This is especially true when it comes to companies that are into service provisioning (Xie *et al.*, 2004).

More importantly, this embraces telecommunication businesses, in which application of Trouble Ticketing Systems (TTSs) forms the core of the decision support system (DSS) to provide an information that can quickly provide relevant data to make decision and choose course of action (Boone & Kurtz, 2006).

The use of TTS has become commonplace within corporate business environment worldwide (Cell Centre News, 2003). It has become one of the fastest growing segments in today's communication workplace. To Spolsky (2000), it is one of the hallmarks of a good communication software team; especially, in today's era of intense competition and rapidly changing global telecommunication market arena (Boone & Kurtz, 2006; Griffin *et al.*, 2005).

### 2.1.1 Defining trouble ticketing system

The concept of TTS has been numerously debated and construed by many scholars, practitioners and researchers alike. In effect, several terminologies have been submitted to it. Sometimes, the term is found to be synonymous with: support tracking system (STS); support ticket (ST); request management (RM), or incident ticket system (Spolsky, 2000; Home Depot, 2002).

Boone and Kurtz (2006) regarded it as an enterprise resource planning (ERP) system. To them, ERP serves as a set of integrated computerized programmes designed to collect, process and provide information about all business operations.

Related, it has been reported that, William Beaumont Hospitals, based in Royal Oak, Michigan, has installed a recent version of TTS business suite as a single set of computing standards for the entire organisations (Oracle, 2003).

For some scholars, it is a system and method for managing the collection, trending, and tracking of trouble ticket data within a data processing environment (Turnbull *et al.*, 2002).

Broadly, it involves a central data storage facility for storing trouble ticket data including, archival type data corresponding to customer support requests and inquiries according to a common data storage scheme, and a plurality of data processing systems coupled to the central data storage facility via a network system. Podracky (2001) again construed it as a digital computerized repository that is populated with information regarding service providers, end-users and trouble ticket status information.

The author further opined that, a common interface is mostly provided through which all of service providers may concurrently generate trouble tickets and access ticket status information in the database.

These attempted definitions notwithstanding, Spolsky (2000) has also put forth a definition of TTS that is noteworthy. Accordingly, TTS in a corporate business environment connotes a computerized information support software package that manages and maintains lists of issues as needed by the organisation.

Clearly, the widespread popularity of the concept of “trouble ticketing system” is not equally matched with consensus concerning its precise and unambiguous meaning. Implicitly, the concept of trouble ticketing system lacks a universally accepted definition that can fit all circumstances.

The term is utilized broadly to denote a series of integrated computerized information technology system, well-customized to gather vital data in a logical manner, of which its ultimate aim is to make informed decision and to choose the right course of business-oriented action in a corporate milieu. This can be taken as a workable definition that can suffice very well in a company-wide telecommunication context.

### **2.1.2 Forms of trouble ticketing systems**

There is considerable evidence of a number of trouble ticketing systems. The more commonly noted ones evidenced in the extant literature encompass: help desk, service desk, and asset management systems (Middleton, 1996). In this review emphasis has been put on help desk.

Thus defined, a help desk is a typical example of TTS, which describes a computerized resource intended to provide the customer or end user with information and support related to a company's or institution's products and services (Wikipedia, 2016; Goyal, 2010; Rainer & Cegieski, 2009).

Typically, large help desks have several teams that are experienced in working on different issues. The queue manager mostly assigns an issue to one of the specialized teams based on the type of issue raised.



Some help desks may have telephone systems with ACD splits ensuring that calls about specific topics are put through to analysts with the requisite experience or knowledge.

### **2.1.3 Historical account of trouble ticketing system**

It is generally observed that, just a few decades ago, computerized-based support systems were considered exotic curiosities, used only by scientists and the military oriented organisations.

Today however, they have become indispensable not only to businesses, but to households as well (Boone & Kurtz, 2006). The import is that, computerized IT support systems including, trouble ticketing technologies continue to revolutionize the methods by which people and businesses, such as telecommunications networks manage information (Goyal, 2010).

In many ways, this variant of computerized support system application has leaped beyond numbers, texts and graphs to encompass multimedia and interactive capabilities (Boone & Kurtz, 2006) such as: electronic mails; web-based call centres; electronic chat rooms; and voice communications; as well as unified communications (Rainer & Cegielski, 2009; Goyal, 2010).

Equally obvious is the fact that, the phenomena of time and place have always been at the centre of business. That is, customers long ago had to go to the business premises during certain hours of the day in order to satisfy their needs (Nickels *et al.*, 2008).

This implies that, not long time ago, businesses decided when and where customers did business with them. Nonetheless, IT applications, such as TTS allow businesses to deliver goods and services whenever and wherever it is convenient for the potential or actual customer (Lamb *et al.*, 2008)

In the mid-1990s, yet another change occurred in the terminology of computerized business suite technology. As a result, the world of business started moving away from IT and toward knowledge technology (KT), which has changed the traditional flow of information; instead of an individual going to the database, the database comes to the individual (Boone & Kurtz, 2006).

It is generally reported that, as knowledge technology became more sophisticated in the mid-2000s, it became better known as the business intelligence (BI); referring to a variety of computerized software applications that can analyze an organisation's data and take out useful insight from it.

Business intelligence activities include a wide range of information technology issues, including: data mining, online analytical process, querying and reporting (Levinson, 2005; Meridith, 2006). These form the basis of TTS applications in contemporary telecommunication business and customers' data flow management process (Boone & Kurtz, 2006).

#### **2.1.4 EURESCOM Project P612 contribution to development of TTS**

The EURESCOM P612 project was a TMN project focusing on the ITUT Recommendation X.790 on Trouble Management, which it profiled and validated in the EURESCOM pan-European TMN Laboratory environment.

It developed a generic, interoperable trouble ticketing process for the X interfaces involved in trouble management. That is, the X-user interface between a connectivity provider management domain and a customer network management domain, and the X-coop interface between two peer connectivity provider management domains. The P612 specifications and GDMO information model have been used to design and implement the network level TTS used in the Service Quality Assurance System (Agoulmine *et al*, 2000).

Tele management forum provides the telecom industry with leadership on the most effective ways to streamline the management of communications networks and services. It has recognized the need to support the end-to-end automation of business processes within the service provider environment and has investigated how the processes involved in telecommunications management relate to each other.

The current focus is on the integration of all these processes into process “flow through” services built around three high level processes of fulfillment, assurance, and billing of telecommunication services. The Service Quality Assurance System (SQAS) is implementing a subset of these processes concerned with problem handling.

Thus, within the business process framework, the TM Forum has defined a set of detailed specifications to support important customer-to-business and business to-business management processes. For multi-domain problem handling the Service Provider (SP) to Customer Performance Reporting Business Agreement (CPRBA) and the Performance Reporting Definitions Document (PRDD) were taken into account.

More significant to note, these documents help defined the inherent requirements, concepts, and terms for service level agreements, quality of service measurement, and performance reporting systems, which are mostly used in developing the Service Quality Assurance Systems.

The tele-management forum documents Trouble Administration Business Agreement Customer to Service Provider Trouble Administration Information Agreement that also defines the requirements, concepts and terms for trouble management between customer and service provider. Accordingly, it also embraces the documents Customer to Service Provider Trouble Administration Analysis Specification and CORBA Interface Specification for Customer to SP Trouble Administration specify the interfaces for CORBA based systems.

In fact, all these documents have been used for the design of the TINA Trouble Report System (TTRS).Agoulmine *et al*. (2000) have confirmed that in the past, call centers and other customer service centers providing help-desk and related services spent significant time and resources to produce accurate trouble tickets related to customer inquiries, to track such tickets and related data, and to perform trend analysis related to the same.

The solutions presented to date to effectively manage and process customer support inquiries ran the gamut from manual ticket recording and processing schemes to elaborate and widely distributed automated systems.

Unfortunately, typical customer support ticketing, tracking, trending systems present serious and significant barriers to effective management control. Even worse, traditional systems do not lend themselves to central storage of customer service ticket data, effective and efficient analysis of such data, and easy tracking of the same. Such problems are exacerbated by the fact that many systems often involve disparate technologies and platforms that do not effectively communicate with each other.

And, another frustration often realized is the fact that many systems are not well suited to particular customer service needs. As such, organizations involved in providing customer support oftentimes must spend significant time and resources to develop otherwise custom solutions and systems to service the needs of their customers.

To make matters worse, prior systems do not allow efficient and effective querying of older, archived trouble ticket data. In particular, organizations involved in providing customer support continue to have no effective way to query prior period trouble ticket data to drive trend analysis and corresponding resource allocation. As such, many organizations either over spend resources in efforts to review prior period trouble ticket data, or do not avail themselves of statistical data that can be used to streamline support processes and, ultimately, to save on resource expenditures. (Turnbull *et al*, 2002).

### **2.1.5 Trouble Tickets & Call Tags**

The ability to record, assign, escalate, and follow-up on issues, and to accurately quote resolution estimates is essential to subscriber acquisition and retention automatic matching issue alerts and ticket merge capabilities are also supported, allowing users to simultaneously process and resolve all issues of a similar nature (i.e.: outages).

Each caller's demeanor and churn score are tracked through every process. Extensive issue, cause and resolution management reports and alerts are standard features (Podracky, 2001).

A trouble ticketing system, method, and computer program product for supporting multiple service providers, each of the service providers having end-users connected to a common high-speed network for broadband data transport services. A digital repository is populated with information regarding the service providers, the end-users and trouble ticket status information.

A common interface is provided through which all of the service providers may concurrently generate trouble tickets and access ticket status information in the database. Trouble ticket status information is updated by the operator of the high-speed network to reflect a current status. (p.215).

The author compared the trouble ticket to a patient's hospital chart, because both define a problem and help to coordinate the work of several different people who will work on the problem at different times.

### **2.1.6 FMTS and Wiener Filter for speech denoising**

Mobile users communicate in different environments with varying levels and types of background noise such as traffic noise, car engine noise, cafeterias among others. It is the need to suppress this acoustic background noise which is very key but challenging in the current telecom industry. Reduce listener fatigue, improve quality of speech and provide intelligibility of speech.

Voice control of devices and appliances is becoming more and more prevalent particularly the “hands free” control of mobile telephones. The minimum spectral tracking algorithm proposed by Martin (2001) requires a long segment of speech to work effectively and has a large latency.

This noise estimation technique gives accurate results even at very low signal-noise ratio and works continuously, even in the presence of speech. It is effective for both non-stationary and colored noise. Enhanced speech of good quality is obtained by the Wiener filter.

### **2.1.7 Telecommunication services and charges**

A telecommunication system consists of hardware and software that transmit information from one location to another. In most cases, these systems do transmit text, data, graphics, voice, documents, or full motion video information (Rainer & Cegielski (2011). it is sometimes succinctly called telecom.

Typically, examples include phone, radio, television and internet SPs, such as Vodafone Ghana, JOY FM, GTV and Busy Internet in Ghanaian context respectively. The medium of transmission may include: Wire (Copper); Fiber Optics; Ether (wireless); Radio towers; Microwave; Satellite, and among others.

The basic telecom services being provided by various well known telecommunication operators like Vodafone are in the family of: Telephony services, Cable TV, Internet, Leased Line and may provide a number of communication oriented services including: Voice Call; Fax Service; SMS & MMS; Internet Connection; Data Traffic / Download and Upload; Video Conferencing; and IP based services (i.e. voice over IP or VPN), as well as, Roaming Telecommunication services.

Between these services are various charges, which may be rental charges or usage charges. Rental charges are mostly taken from the customers on monthly basis against a service provided. For example, your telephone monthly charges would be \$5.00 regardless you use it or not.

Usage Charges however are the charges taken from the customers based on the service utilization. For example, you would be charged for all the calls made or data downloaded using your phone. These are categorized into

- i. Pre-pay Billing: A billing mechanism where customer pays in advance and after that starts using a service. Usually, prepaid customers do not receive any invoice

and they are charged in real time by the highly available billing systems called Intelligent Network (IN).

- ii. Post-pay Billing: This is the conventional billing, which is coming for many years. Here, customers buy products and services and use them throughout the month, and by end of the month, invoices are generated by the service provider and sent those invoices to the customers to make their due payment.
- iii. Interconnect Billing: The network operator is usually financially responsible for services provided to its customers by other networks regardless of whether or not the customer pays for the service. Interconnect billing is related to inter-carrier or sometimes called partner settlements.
- iv. Roaming Charging: When a customer goes from one network operator's coverage area to another operator's coverage area, first operator would pay marginal charges to second operator to provide services to their customers. Such types of charges are settled through roaming billing. This settlement is done as per TAP3 protocol, which I will discuss in upcoming chapters.
- v. Convergent Billing: Convergent billing is the integration of all service charges onto a single customer invoice. Convergent billing means creating a unified view of the customer and all services (Mobile, Fixed, IP, etc.) provided to that customer.

### **2.1.8 Customer Relationship Management**

It has been observed that, customer acquisition is the process of identifying, attracting and retaining potentially profitable customers. This is handled using a system called Customer Relationship Management (CRM) which is one of the important business support system (BSS).

To Rainer and Cegielski (2011), CRM denotes an organisational strategy that is customer-focused and customer-driven. In support of this assertion, Lamb *et al.* (2008) conceived it as a company-wide business strategy designed to optimize profitability, revenue, and customer satisfaction by focusing on highly defined and precise customer groups.

Their assertion was premised on the assumption that, the ultimate goal of a new trend in telecommunication marketing is to focus on understanding customers as individuals instead of as part of a group. They reasoned that, to do so, telecom marketers tend to make their communications more customer-specific.

Typically, a CRM system would always be connected with various systems including Billing System and feeds customer personal data, product and service information to the billing system.

Hence, a customer who is purchasing telecommunication products and services needs to be activated in the trouble ticketing system and for this various details about the customer are required:

- i. The customer may have to fill up an application form providing personal detail.
- ii. Validate the identity of the customer in order to prevent fraud.
- iii. Service Provider need to carry out a credit check on the customer and assign appropriate credit class based on credit history and monthly income, etc.
- iv. Offer appropriate products which are provisioned at the network to provide the service.

Quite often, once the customer is acquired, it is required to manage and retain the customer, and this process involves:

- i. Interacting and communicating with the customer for sales and collection activities.
- ii. These interactions can be recorded in different formats like notes, voice recordings, and so. This data can be used to analyze the behavior of the customer and helps the service provider to better services in order to retain the customer
- iii. Handling trouble tickets raised by the customer against any problem they face with the network or invoice. This data can also be used to analyze the behavior of the customer and helps the service provider for the betterment of the services in order to retain the customer.
- iv. Handling any bill disputes and adjustments raised in between the customer and service provider.

### **2.1.9 Customer life cycle**

A typical customer life cycle is shown below in the following diagram: All the phases comprising a customer life cycle are briefed here:

- i. Customer engagement: The customer contacts the Customer Service Representative (CSR) and it engages the customer with the various products and services offers by selling them to the customer.
- ii. Order creation and fulfillment: The customer takes the product(s) and services(s) and the CSR creates and completes the order into the system which is then fulfilled by supplying required product and services to the customer.
- iii. Service provisioning: The products and services are provisioned at the network using a system called Provisioning System. The Provisioning System informs the network about the customer's information and the services they are authorized to use. In fact this activates the customer on the network.
- iv. Products utilization: Once the customer is activated on the network, the customer starts using the products & services, like making a call or data download, etc.
- v. Products and services usage is Rated & Billed: Customer usage is collected from the network and then it is rated based on the defined rate plans and billed to apply product rentals and required discounts, adjustments, etc.
- vi. Bill delivery: Once a bill is generated, it is delivered to the end customer demanding for the revenue against the services provided.
- vii. Bill payments: Customer makes the payments against the received invoices.
- viii. Dunning & Collection: There may be many customers who will not pay their bills on time. For such type of customers, different dunning letters are sent to remind them about their payment. If customer does not pay on time then different collections are taken starting from stopping customer service one by one.
- ix. Customer termination: There may be various reasons when it is required to terminate a customer in the system. For example, customer may be migrating to different location, or customer may not be happy with the services provided, etc. One a given date, total number of active customers in the system are called customer base. Adding a customer into the system, terminating a customer from the system, I mean customer addition and deletion in the customer base is called customer churn.

### **2.1.10 Customer types in telecommunication**

Typically there are following types of customers in today's telecom market:

- i. Mobile Pre-Paid Customers: These are the customers who use Mobile services by paying their charges in advance. For example GSM, GPRS phone users. These customers recharge their phone based on their requirement.
- ii. Mobile Post-Paid Customers: These are the customers who use Mobile services by paying their charges after every invoice they receive. For example GSM, GPRS phone users. These customers pay their bills on monthly or bi-monthly basis.
- iii. Fixed Pre-Paid Customers: These are the customers who use fixed line, i.e., landline services by paying their charges in advance. These customers recharge their phone based on their requirement.
- iv. Fixed Post-Paid Customers: These are the customers who use fixed line, i.e., landline services by paying their charges after every invoice they receive. These customers pay their bills on monthly or bi-monthly basis.

### **2.1.11 Tracking system in using TTS**

In trouble ticketing system, a Call Detail Record (CDR) keeps usage details, along with various very useful information. CDR is an event along with all its attributes. It is termed as Usage Detail Record (UDRs).

It is worth noting that, where an issue is found to be a single billable occurrence of product usage, typically it would be captured electronically by the network. For instance, when a mobile phone user makes a telephone call, an event is generated which contains information about that phone call, such as the call duration, the time of day the call was made, and the number that was called. Below are the most important attributes of a CDR:

- i. Calling party (A number)
- ii. Called party (B number).
- iii. Call start (date and time).
- iv. How long the call was (duration).
- v. Call type (voice, SMS, data, etc).
- vi. A unique sequence number identifying the record.

Additionally, a CDR may also record other information such as:

- i. The identifier of the telephone exchange
- ii. The result of the call (whether it was answered, busy, etc.)
- iii. Trunk or route used to connect the call.
- iv. Any fault condition encountered)
- v. Indicators that note the use of features such as call forwarding, three-way calling.
- vi. Any facilities used during the call, such as call waiting or call diversion)
- vii. Various other attributes depending on requirement.

### **2.1.12 Process of trouble resolution**

Trouble report is routed for testing and trouble isolation where the trouble is initially isolated to one of three general areas:

- i. Central office: Includes hardware, wiring, and equipment supporting the network switching or network routing housed inside the Central Office
- ii. Translations: Includes individual line and complex switch translations

- iii. Field: Includes network elements and supporting infrastructure equipment (copper, fiber, NIDs, and electronics) as well as cable outage restoration and proactive maintenance

Technicians in multiple locations across all three general areas may be required to isolate the trouble and restore service. Responsibilities of such help-desk technicians in the context of TTS may include:

- i. Assigning a technician responsible for initial testing on circuits identified in your trouble report (also referred to as a trouble ticket) and isolating trouble
- ii. Routing your report for dispatch to Central Office, Translations, and/or Field Technicians as applicable
- iii. Escalating your report internally until a resource is assigned or progress made
- iv. Performing tests to verify service restoration
- v. Coordinating cooperative testing
- vi. Facilitating test result handoff activity and restoration concurrence
- vii. Assigning resolution codes prior to closing your report

## **2.2 Benefits of computerized trouble ticketing systems in telecommunication**

The utilisation of computerized trouble ticketing system is increasingly beneficial in today's telecommunication business environment (Rainer & Cegielski, 2011). This stems from the fact that, TTS serves as a strategic information system (SIS) that tends to provide companies with:

### **2.2.1 Competitive advantage**

In business environment, the idea of competition is quite keen. As a result, many forward-thinking businesspeople and organisations tend to employ technology-based strategies that can give them competitive edge over their brand competitors.

This is especially true in telecommunication arena, where there is considerable evidence of computerized support systems customized to provide competitive advantage by helping the organisation implements its strategic goals and increase its performance and productivity (Lamb *et al.*, 2008).

In essence, TTSs can invariably assist Vodafone Ghana Plc identify its business strategies in order to compete favorably (Porter, 1985). By so doing, this computerized support system helps the organisation identify its goals, plans and policies that are required to carry out those goals.

The foregoing view is in sync with the notion that contends among others that, trouble ticketing system applications are used in organisations in order to improve their performance (Rainer & Cegielski, 2011). To these authors, this overall performance is sometimes called corporate performance management, or synonymously, business information management or enterprise performance management.

In this sense, trouble ticketing systems can provide a telecom company, such as Vodafone Ghana with the required BI needed to decode a gamut of complex databases often generated with modern day TTSs.



### **2.2.2 Business intelligence for enhanced performance**

It has been observed that, acquisition of BI is another major benefit inherent in the right use of TTS. In a review of one important study for instance, it was evidenced that, TTS aid in monitoring and managing organisation's performance according to key performance indicators (KPIs).

This has ramifications on the organisation's overall revenue, return on investment (ROI), overhead and operational costs (Rainer & Cegielski, 2009). In tandem with this findings, Boone and Kurtz (2006) corroborated that; businesspeople or companies stand to generate hundreds of billions of dollars in revenue through the use of computerized request management systems, synonymously called support tickets or issue tracking systems (Help Desk, 2015; Home Depot, 2002).

### **2.2.3 Reduction in costs of operations**

The inbuilt data processing system and the plurality of data processing systems configured in most TTSs, such as help-desk technologies tend to facilitate the effective and efficient collection, trending, and tracking processes related to the trouble ticket data stored in the central data storage facility via a graphical user interface configured in accordance with the common data storage scheme (Turnbull *et al.*, 2002).

The implication is that, the adoption of state-of-art computerized trouble ticketing system can go a long way to help an organisation deliver its services without wasting time, effort or expense (Goyal, 2010).

In many cases, such technologies ensure reduction in the cost or the amount of scarce resources often used to deliver some services, when compared to the traditions means of product and service delivery (Farese *et al.*, 2002).

### **2.2.3 Customer satisfaction and retention**

Trouble Ticketing Systems are part of organisational strategies, which are said to be customer-focused and customer driven. It serves as contemporary means of helping organisations to concentrate on the process of satisfying customers by assessing their requirements for products and services, and then providing high-quality, as well as, response service (Rainer & Cegielski, 2007; Goyal, 2010).

Implied in the foregoing is a tacit admission that, TTS is a way of thinking and acting in a customer-centric fashion in today's era of intense competition in globalized telecommunication business arena (Griffin *et al.*, 2005).

The reason had been that, the focus of modern organisations has currently shifted from conducting business transactions to managing customer relationship via interactive technological applications, which are strategically customized to serve company-wide bottom-line goals.

To Rainer and Cegieski (2011), organisations recognise that customers are the core of a successful enterprise, and the success of the enterprise depends on effectively managing relationships with them.

Succinctly, use of TTS in telecommunication context in turn helps build sustainable long-term customer relationships that create value for the company as well as for the

customer. In effect, it has the benefit of helping the organisation, such as VGC acquire new customer, retain existing profitable customers, and grow the relationship with new customers.

The above noted perspectives on benefits of trouble ticketing systems are equally shared by another author, who opined that, TTSs determine the requirements, concepts, and terms for service level agreements, quality of service measurement, and performance reporting mostly used in developing the Service Quality Assurance System in customer relationship management (Agoulmine *et al*, 2000).

More so, it has been reasoned that in the past, call centers and other customer service centers providing help-desk and related services tend to spent significant time and resources to produce accurate trouble tickets related to customer inquiries, to track such tickets and related data, and to perform trend analysis related to the same.

Meanwhile, there is ample evidence in the extant literature to indicate that, the solutions presented to date by TTSs tend to effectively manage and process customer support inquiries, which runs the gamut from manual ticket recording and processing schemes to elaborate and widely distributed automated systems.

In sum, it can be argued that the use of TTS in telecom organisations has the benefit of efficiency and effectiveness in addressing a myriad of issues within the shortest possible time.

This means that, in generally, TTSs are tailored computerized interactive support systems geared towards attainment of organisation's KPIs and CRM goals in modern day communication businesses.

### **2.3 Telecom operations in Ghana**

Today, majority of people is using phones; be it mobile telephony or land line telephony. At the same time, numerous communication oriented services are provided by telecom operators in Ghana.

These SPs include globe giants telecommunication operators such as; Vodafone, Airtel, Glo, Tigo, MTN and Expresso. In this study however, the focus has been on the use of TTS in the context of Vodafone Ghana.

#### **2.3.1 History of Vodafone**

It is generally observed that, Vodafone is one of the world's leading international mobile communication companies. Review of available literature posits that, currently it has operations in twenty-five (25) countries across five (5) continents. The telecommunication company is found to be associated with 40 partner networks with over 260 million customers worldwide.

##### **During 1980's:**

Vodafone made the UK's first mobile call at a few minutes past midnight on 1st January 1985. Within fifteen years, the network was the largest company in Europe and the largest of its kind anywhere in the world.

By the turn of the century, almost every second UK citizen had a mobile – and a third of them were connected to Vodafone. The Vodafone story is one of investment, innovation and award-winning customer service.

Above all, it's one of growth and the ability to deliver the tremendous benefits of mobile communications, not just in the UK but worldwide. The Racal electronics group wins its bid for the private sector UK cellular license. It sets up the Racal telecoms division and names the new network 'Vodafone' to reflect the provision of voice and data services over mobile phones.

Based in Newbury, the company has less than 50 employees, all in one building. Within this same period, the Vodafone analogue network is the first cellular network to launch in the UK, and the first call is made from St Katherine's dock in London to Newbury on 1 January 1985. It was by this time recognized as the largest mobile network in the world.

### **Vodafone during 1990's:**

The company called Racal and Vodafone demerge. Vodafone and telecom Finland make the world's first international roaming call. At this period, Vodafone launched its digital (GSM) mobile phone service – the first in the UK. Vodata is the first network operator in the UK to launch data, fax and SMS services over the digital network.

Vodafone telecommunication joins the global star consortium to develop and launch a low earth orbiting satellite mobile phone service. Vodafone is the first network operator in the UK to launch a pre-pay analogue package. Per second billing on the digital network is introduced, as well as options to buy 'bundled' minutes and make off-peak local calls to landlines.

Vodafone air touch plc is created as a result of a successful merger between Vodafone group plc and air touch communications Inc. On 5 January Vodafone connects the five million customers in the UK

### **Vodafone during 2000's:**

Vodafone's acquisition of Mannesmann Ag almost doubles the size of the Vodafone group making it the largest mobile telecommunications company and one of the top ten companies, by market capitalization, in the world. Vizzavi is launched, a 50/50 joint venture between Vodafone air touch and Vivendinet to deliver a multi-access branded internet portal for Europe.

Vodafone acquires the largest available 3G license in the UK. In parallel with the development of 3G, Vodafone announced its intention to offer GPRS (general packet radio service) to UK corporate customers.

Vodafone introduces instant messaging to its networks. Vodafone makes the world's first 3G roaming call between Spain and Japan. The Vodafone group foundation was launched at this period. The group and its subsidiaries plan to contribute £20 million to community programs, guided by the group social investment policy.

Orange, telefonica mobile, T-Mobile, and Vodafone formed a new association to drive interoperable mobile payments. Vodafone simply was launched, giving customers new, easy-to-use voice and text services. it introduced passport, a new voice roaming price plan. The number of Vodafone lives Customers with 3G has reached about 10 million.

### **2.3.2 Vodafone Ghana**

Vodafone Ghana, formerly “Ghana Telecom,” is the national telecommunications company of Ghana. In 2006, it had around 400,000 customers for fixed and mobile telephony and Internet services. On 3rd July 2008, the sale of the company for \$900 million to Vodafone Group was announced.

Vodafone in Ghana is one of the latest additions to Vodafone Group Plc, the world's leading mobile telecommunications company. This followed the successful acquisition of about 70 percent shares in the Ghana Telecommunications Company on July 23rd, 2008. Consequently, on 16th April 2009, the company was rebranded as Vodafone Ghana. It is recognizable that, Vodafone Group Plc is making significant in-roads in Africa and currently operates in Kenya, South Africa, Tanzania and Mozambique.

It has significant presence in Europe, the Middle East, Asia Pacific and the United States (US) through the company's subsidiary undertakings, joint ventures, associated undertakings and investments. It has a unique portfolio of products and services and provides customers with high speed access to the internet, mobile services and fixed lines.

The company applies the latest industry technology and is keen on building the most versatile network. Vodafone promises quality service on the network and excellent customer service.

### **2.3.3 Ghana National Communication Authority**

The first Act of Parliament; National Communications Authority Act of Parliament, Act 524 of 1996; established the NCA in 1996 to regulate all communication activities and services in the country.

#### **Legislation:**

Below are some lists of laws that regulate and bind the communication service industry in Ghana.

National Communications Authority Act of 2008, Act 769 – Is an Act to establish the NCA as the central body to license and regulate communications activities and services in the country; and to provide for related purposes.

The Electronic Communications Act of Ghana, Act 775 of 2008 - This is the Act that provides for the regulation of electronic communications, the regulation of broadcasting, the use of electronic-magnetic spectrum and for related matters.

Electronic Communications Amendment Act, ACT 786 - This is an act to amend the Electronic Communications Act, 2008 (Act 775) to provide the minimum rate for international incoming electronic communication traffic and for related matters.

The Electronic Transactions Act of Ghana, Act 772 of 2008 – this is an act for the regulation of electronic communications and related transactions and to provide for connected purposes.

The National Information Technology Agency, Act 771 of 2008 - The Act to establish an agency to regulate information communications technology in Ghana

**Guidelines:**

There are also several guidelines presented for the mounting and development of communication towers across the land space of the country.

**Schedule of penalties for defaulters:**

In 2008, the NCA announced to General Public, particularly current and prospective operators and service providers in the communication industry, that it has introduced a Schedule of Penalties for defaulters of its statutory provisions, licensing/authorization conditions as well as its rules and directives. These sanctions as at now have applied to about three of the communication service providers including Vodafone in the recent.

**2.4 Challenges in the use of TTS**

Just like the use of any form IT solutions, the use of TTS in telecom context is often challenged by a plethora of issues. These tend to thwart the smooth realization of the inherent benefit in the development of issue tracking systems.

Rainer and Cegielski (2007) have indicated that, data processing with information technology support systems should be: accurate, timely, consistent, accessible, relevant and concise. Unfortunately, however, the process of acquiring, keeping and managing data with the use of computerized trouble ticketing systems is becoming increasingly difficult.

Indeed, these scholars put forth certain challenges that must be considered in this literature review. That is, they reasoned that managing data with customer service support system, such as TTSs is difficult for many reasons:

*First, the amount of data increases exponentially with time. But, much historical data must be kept for a long time, and new data are added rapidly. This invariably tends to challenge the way data is stored and processed.*

*In addition, data are also scattered throughout organisations and are collected by many individuals using various methods and devices. These data are frequently stored in numerous servers and locations and in different computing systems, databases, formats, and human and computer languages.*

*Another challenge is that data come from multiple sources: internal sources, personal sources, and external sources. In telecommunication context for instance, data also come from web, in the form of clickstream data.*

*Adding to these challenges is the fact that new sources of data, such as blogs, podcasts, video casts, and RFID tags and other wireless sensors are constantly being developed. Much of these new data are unstructured, meaning that their content cannot be truly represented in a computerized record, often configured in most TTSs, such as help-desk, and among others in the market (Rainer & Cegielski, 2011, p. 126).*

From the foregoing espousals, it can be discerned that major challenges that tend to hinder the use of issue ticketing system in telecommunication organisations result from intermix of factors.

Prominent among them encompass the problem associated with: complexity of data management, rapid technological obsolescence (Martin, 2004), and high cost of computerized TTSs (Gitman & McDaniel, 2002; Farese *et al.*, 2002).

Particularly, technology is not static (Martin, 2001). Hence, the growth of new technology, such as computerized trouble ticketing system is not always capable of living up to its image or the claims of its designers and salespeople. This implies that, the rapidity with which TTS applications change in the market tends to adversely affect its usage in telecommunication turf.

In addition, the growth of new technologies, such as TTS within emerging competitive telecommunication environment also reflects a process that has major implications for jobs and organisations. The search for loyal customers mostly forces managements to engage in fierce competitive strategies, which are unethical normal in business practice (Rainer & Cegielski, 2011).

The crux of the matter has been that, intense competition for actual and potential customers may lead to price wars (Lamb *et al.*, 2008). In many cases, competition in the global telecommunication marketplace has often forced business-oriented organisations to lower prices.

This in the long run tends to adversely affect the KPIs of small-to-medium scale businesses. It should come as no surprise that, in Ghanaian telecommunication space, several firms have come and rebranded and some near extinction due to intense era of competition in the business arena.

## **2.5 Theoretical perspectives on TTS technology in telecom**

It is an undeniable fact that, the impact of technology on an organisation, such as Vodafone Ghana Plc, has been studied from a myriad of perspectives based on a differing view of what TTS technology actually is. In this study, couple of theoretical views considered includes:

- i. Thomson – resource and technology matching, and
- ii. Porter’s competitive force model.
- iii. Woodward and production technology
- iv. Perrow’s theory of a continuum from routine to non-routine,
- v. Porter’s value chain model

### **2.5.1 Thomson resource and technology matching**

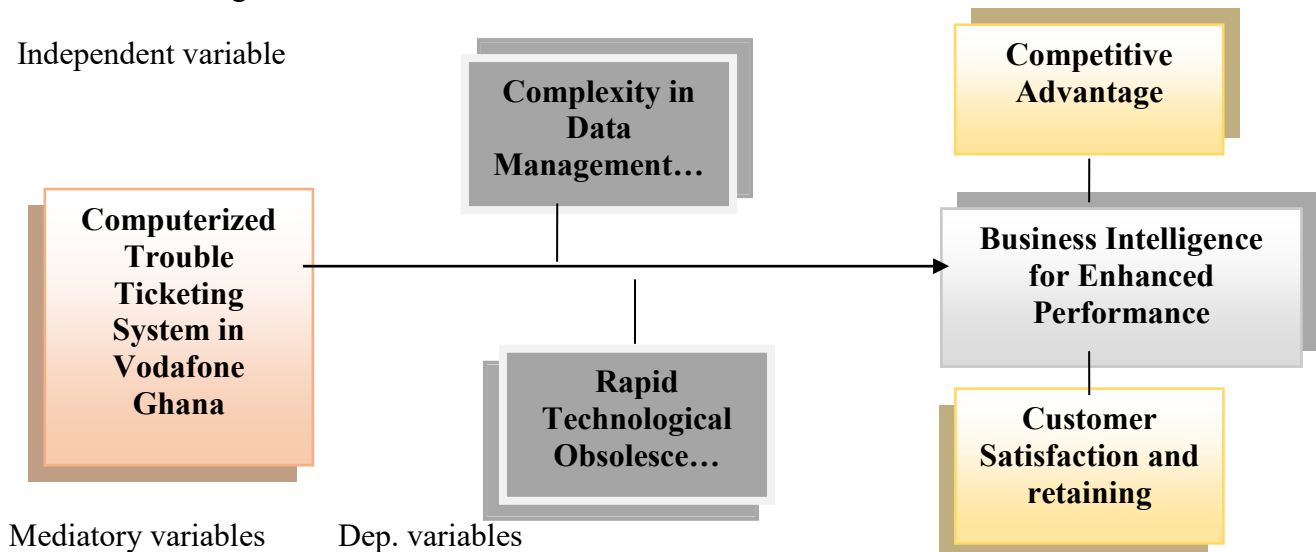
In this view, it is argued that the organisation attempts to arrange its resources and processes in such a way as to allow its natural technological tendency.

Accordingly, Thompson (1967) is noted to have identified three categories of technology: Long linked; mediating; and intensive.

In overall essence, this perspective of TTS technology reflects Vodafone’s attempts to achieve broad objectives, such as ensuring that the processes contained in its TTS technology: can fit together effectively in producing the end result; bringing together what would otherwise be independent activities or needs; and attempting to provide a personal level of service within a standardized framework.

## 2.6 Conceptual framework

The key variables identified with the research objectives and questions proposed have been summarily presented with the use of a conceptual framework. This modeled the pattern of relationship between variables. This figure has accordingly been labeled as figure 2.0:



Source: Researcher's construct

**Figure 2.1: Conceptual Framework Showing Pattern of Relationship between Variables**

The figure 2.0 above displays a unidirectional relationship between the independent variable of computerized trouble ticketing system and dependent variables of benefits of using computerized trouble ticketing system.

The relationship is further intercepted by other mediatory variables, which are mostly challenges that tend to thwart the smooth realization of inherent benefit of TTS in Vodafone Ghana Plc.

The independent and the mediatory variables tend to impact on the level of benefits likely to result from the effective and efficient use of computerized trouble ticketing system in the company.

## 2.7 Contribution to knowledge

So far, it can be realised from the volume literature been reviewed thematically that the concept of computerized trouble ticketing system (TTS) has been numerously conceived by many people.

Regardless, it lacked a single all-purpose definition that fit all circumstances. Hence, the study adds to existing knowledge by proffering a seemingly comprehensive and workable exposition of the term.

More so, there is no directly related study that used Vodafone Ghana Plc. as the main case study. This explained the paucity of data when it came to the area of computerized trouble ticketing systems' research in the context of VG Plc.

Similarly, the study filled the gap in existing literature with the contextualization of the study in the local telecommunication environment. Invariably, this will go a long way to assist other scholars who may decide to conduct studies in this domain.

These notwithstanding, the study contribute to existing knowledge by way of modeling a conceptual framework. This modeled the pattern of relationship that existed between key variables been identified in the research objectives and their corresponding research questions.



## **CHAPTER THREE**

# METHODOLOGY

## 3.0 Introduction

The chapter described the methodology adopted for the study. It highlighted research procedure applied in the collection of quantitative data used in the statistical analysis of data set.

It outlined research methodological themes including: research design, population of the study, sample and sampling technique. It also indicated research instrument; data collection methods; data analysis; and ethical considerations. It concluded with problems encountered in research procedure.

## 3.1 Research design

The study was a quantitative exploratory survey that utilised conveniently selected research subjects in a study that sought to explore computerized trouble ticketing system and its inherent benefits in Vodafone Ghana Plc.

Cross section of vital data collected with the aid of structured questionnaires have been analyzed descriptively, results of which have been used to explain benefits of TTS in VG Plc.

## 3.2 Population of the study

The total number of research elements, whose responses and opinions were elicited was made up of the entire employees of Vodafone Ghana Plc. These included both technical and regular employees, as well as, actual and prospective individual and corporate customers within Accra Metropolitan Area (AMA).

## 3.3 Sample and sampling technique

In many cases, census of a given research population are so enormous as to preclude the possibility of its use. In addition, it has been demonstrated time and time again that, a relatively small but carefully selected sample of a population can accurately reflect the true characteristics of the universe from which it is drawn.

The subset of the population from, or about which information was obtained was made up of representative cross section of about one hundred and thirty-five (N = 135) research subjects.

Nonprobability sampling technique of purposive sampling method was used to select all the elements drawn from the sampling frame. The choice of this sampling technique was based on the idea that, it was found to be simpler, less time-consuming, and less expensive way of getting representatives, who satisfy the purpose of the study.

## 3.4 Instrument of measurement

A structured self-administered questionnaire was the main instrument crafted and utilised to gather a cross section of essential quantitative data set needed for analysis. This survey instrument was captioned: Questionnaire for Collecting Data on Computerized Trouble Ticketing System and Its Inherent Benefits in Vodafone Ghana Plc.

It has four main sections, notably: A, B, C and D. Section A outlined socio-demographic characteristics of respondents. Key variables measured in this section entailed: gender, age group, educational attainment, service or product of the user and relationship status in the organisation. Section B contained variables, which measured the exact nature of TTSs in the context of VG Plc.

Section C presented variables that tended to measure benefits inherent in the use of TTSs in VG Plc. The instrument continued with Section D that also indicated questions that measured challenges facing the organisation in the use of computerized trouble ticketing systems in the telecom arena.

The instrument concluded with section E, which showed items that measured recommendations for managing a myriad of challenges that tend to thwart realisation of the inherent benefits in the use of TTS in the company. It is noteworthy that, research items have been measured on nominal and ordinal levels of measurement.

The socio-demographic characteristic of gender for example had been set and measured as: Gender: a.  Male, b.  Female. In addition, other questions in the sections have also been measured on the ordinal level, with the aid of a set of five level Likert scale, which ranged on a continuum of: a.  strongly disagree; b.  Disagree; c.  Neutral; d.  Agree, and e.  strongly agree.

#### **3.4.1 Reliability and validity of research instrument**

It is generally agreed that, whatever procedure for collecting data set should always be examined critically in order to really assess to what extent it is likely to be reliable and valid (Bell, 2004).

In view of this, research items been measured were subjected to rigorous and robust research procedure so as to produce similar results under similar research conditions on all situations.

In effect, samples of some similarly crafted research instruments were administered to selected respondents in a similar organisation time after time. In order to ensure validity of responses, the study again managed to obtain a representative range of responses as possible to enable researcher fulfills the objectives of the study that provided answers to key questions.

#### **3.5 Data generation procedure**

Two common sources of gathering data, including: primary and secondary sources were heavily relied on. Primary data gathered comprised responses elicited with the aid of structured questionnaires administered to the targeted respondents.

Secondary data collected from existing studies and documents also helped in providing the framework for the research project, and development of research questions. In particular, this information was mined from internal databases of the organisation, as well as document and books; both published and unpublished. Similarly, articles and abstracts in academic journals were consulted.

### **3.5.1 Data management**

Data is recognised to be the single most important influence on the quality of decisions. In essence, poor decisions are usually the result of using incorrect information available (Hopper, 2000).

To this end, cross section of data set been gathered has been developed, captured, processed, and managed so that it can be readily used in generation of appropriate results.

Specifically, quantitative data collected from respondents have been carefully screened for their correctness and appropriateness. These were then inputted into data matrix automatically provided by the assistance of “Software Package for Social Sciences” (SPSS), which aided data analysis.

### **3.6 Data analysis**

Descriptive statistic model was used to analyze the data collected from respondents in the field. The selection of this particular statistical model was based on the notion that, it was found to be the best way of presenting data results in a more convenient and usable form. In effect, results generated have been presented with descriptive statistics tools: frequency distribution and statistics tables.

### **3.7 Research ethics**

The study observed certain vital research ethics. These involved considerations of ethical principles such as: informed consent of research subjects, safety of respondents and participants, as well as, promoting privacy and confidentiality of responses been provided by respondents.

These were part of the designed questionnaires administered to the research participant field respondents from whom; responses were collected (refer to Appendix B for a sample of consent letter).

### **3.8 Problems encountered during the research procedure**

Nonresponse bias was encountered during the research instrument administration. This happened when the initial questions crafted led some participants to respond in particular erroneous way. This problem encountered has been minimized by paying special attention to crafting of questionnaires.

To do so, the study tried to avoid repetition of question items that were initially found to be difficult in answering. More importantly, good rapport was established between respondents. This afforded the researcher ample opportunity to explain all the benefits and costs associated with voluntary participation in the study.

## CHAPTER FOUR

# ANALYSIS AND DISCUSSIONS

## 4.0 Introduction

The chapter contained the results of quantitative data collected from respondents in the field. This detailed statistical analysis and qualitative discussions on these descriptively analyzed data results.

In all, one hundred and forty (140) structured questionnaires were administered to research subjects, out of which one hundred and thirty (135) were correctly retrieved for analysis.

It has four major sections: socio-demographics of respondents, nature of computerized trouble ticketing system; inherent benefits of computerized trouble ticketing system; and major challenges hindering the effective use of computerized trouble ticketing systems in the organisation.

Statistical tools including; frequency distribution tables, descriptive statistics tables, and graphs were extensively utilised in presentation of result findings. Each section has been presented with the aim to answer the research questions in order to achieve the specific research objectives, which sought to:

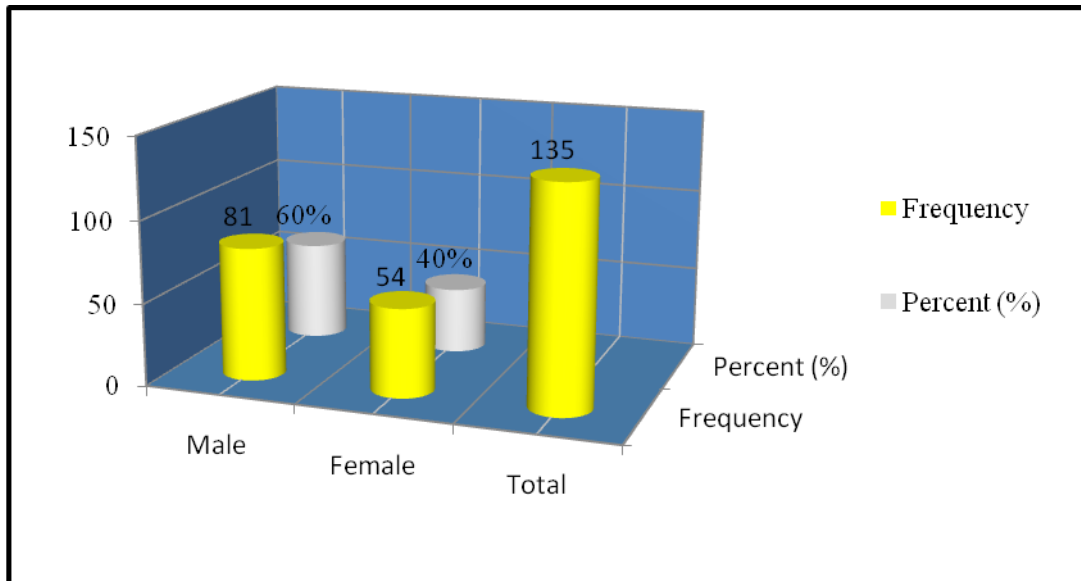
- i. Explore the nature of computerized trouble ticketing system in the organisation,
- ii. Examine the inherent benefits of computerized trouble ticketing system in the organisation,
- iii. Identify the major challenges that hinder the effective use of computerized trouble ticketing systems in the organisation.

## 4.1 Socio-demographics of respondents

The study explored demographic characteristics of respondents since they form the basis of telecommunication market and service choice. Consequently, vital demographic characteristics considered entailed: gender, age, number of years for using network, type of customer and network service usage, details of which are as follow:

### 4.1.1 Gender of respondents

The analyzed results obtained from the descriptive analysis of the socio-demographic characteristic of respondents' gender have been presented summarily with the aid of a bar chart labeled 4.1.



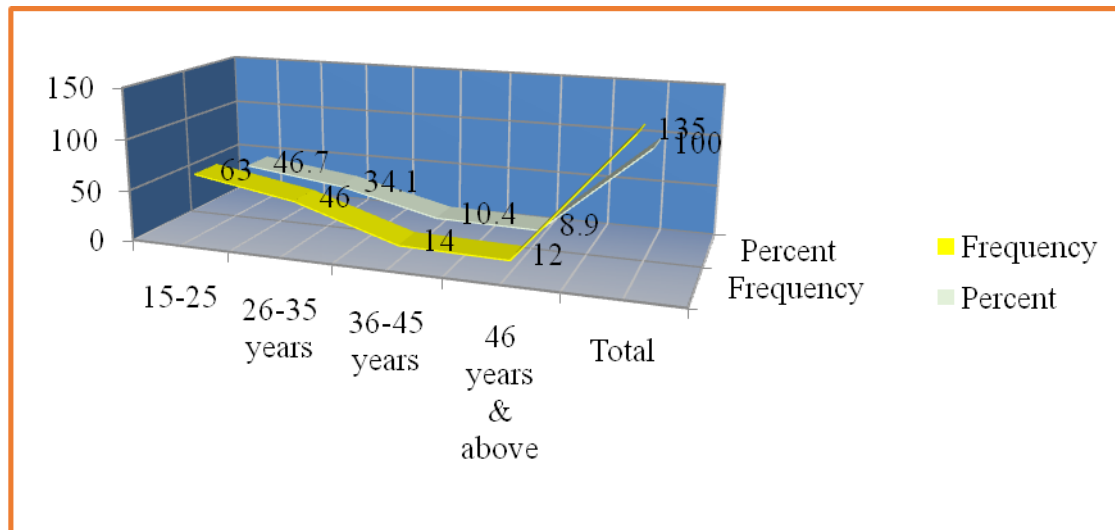
**Source: Field survey (2016)**

**Figure 4.1: A Bar Chart Showing Gender Distribution of Respondents (N = 135)**

Figure 4.1 displayed above reported statistics results measured within the gender variable. It indicated male 81 (60%) and female 54 (40%). The descriptive results (as reflected on figure 4.1) posited disparity in gender representation, which was skewed in favour of male respondents.

#### 4.1.2 Age of respondents

The analyzed results obtained from the descriptive analysis of the socio-demographic characteristic of respondents' age categories have been presented summarily with the aid of a line chart labeled 4.2.



Source: Field survey (2016)

Figure 4.1: Number of Years for Using Vodafone Ghana's Services (N = 135)

Figure 4.2 indicated four categories within the socio-demographic characteristic of age of respondents. It reported; 15-25 years 63 (46.7%); 26-35 years 46 (34.1%), 36-45 years 14 (10.4%); and 46 years or more 12 (8.9%) of the data set N = 135.

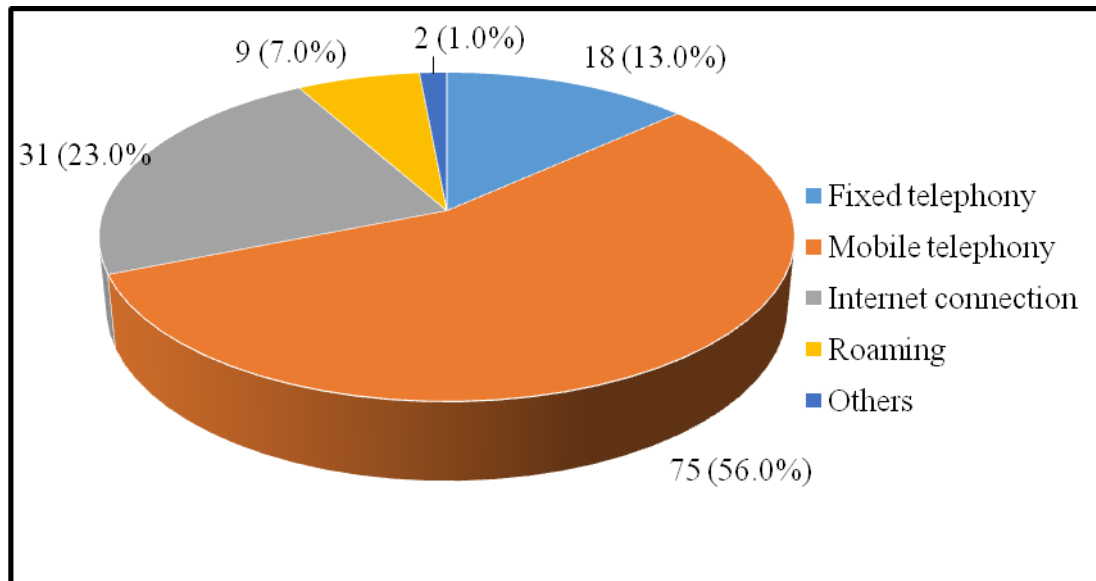
The statistics results (as reflected in figure 4.2) above presupposes that, a relatively more proportion of research subjects of about 46.7% are within the age cohorts of 15-25 years.

This suggests a very promising market. The reason had been that, people within this age brackets are young people, whom when attracted and retained can serve as loyal customers for many years.



### 4.1.3 Telecom product or services enjoyed by respondents

The analyzed results obtained from the descriptive analysis of the socio-demographic characteristic of telecom products or service been enjoyed by research subjects have been presented summarily with the assistance of a Pie Chart labeled 4.3 below:



Source: Field survey (2016)

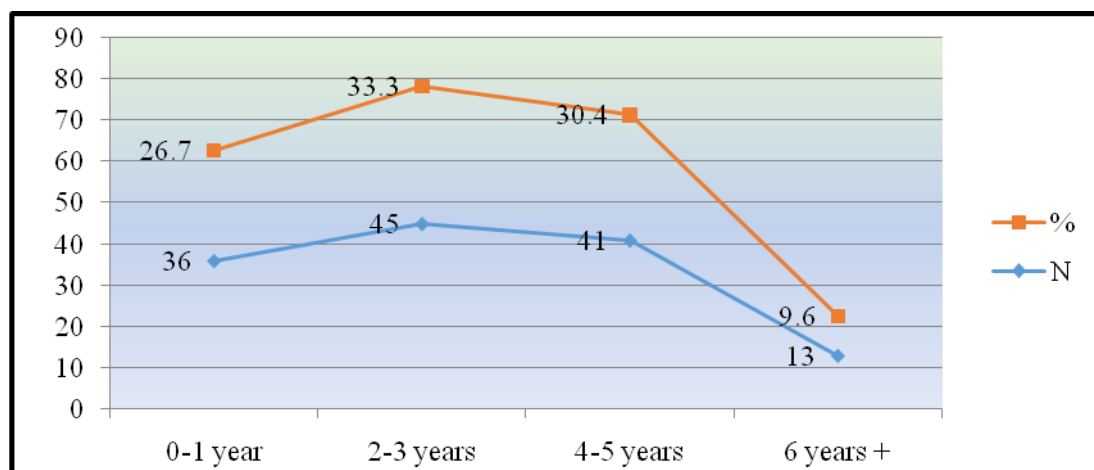
**Figure 4.3: Pie Chart of Products and Service Enjoyed by Respondents (N = 135)**

Figure 4.3 reported; fixed telephony services 18 (13.0%); mobile telephony services 75 (56.0%); internet connection services 31 (23.0%); roaming services 9 (7.0%); and other services 2(1.0%) of the data set N = 135.

More significantly, results (as indicated on fig. 4.3) established that more people currently enjoy mobile telephony products and services provided by Vodafone Ghana Plc., than any other telecom products or services.

#### 4.1.4 Duration for enjoying Vodafone Ghana telecom products or services

The quantitative results obtained from the descriptive analysis of the socio-demographic characteristic of duration for enjoying Vodafone Ghana's telecom products or services have been presented with the aid of a line chart labeled 4.4 below:



Source: Field survey (2016)

Figure 4.4: Line Chart of Duration for Using Vodafone Services (N = 135)

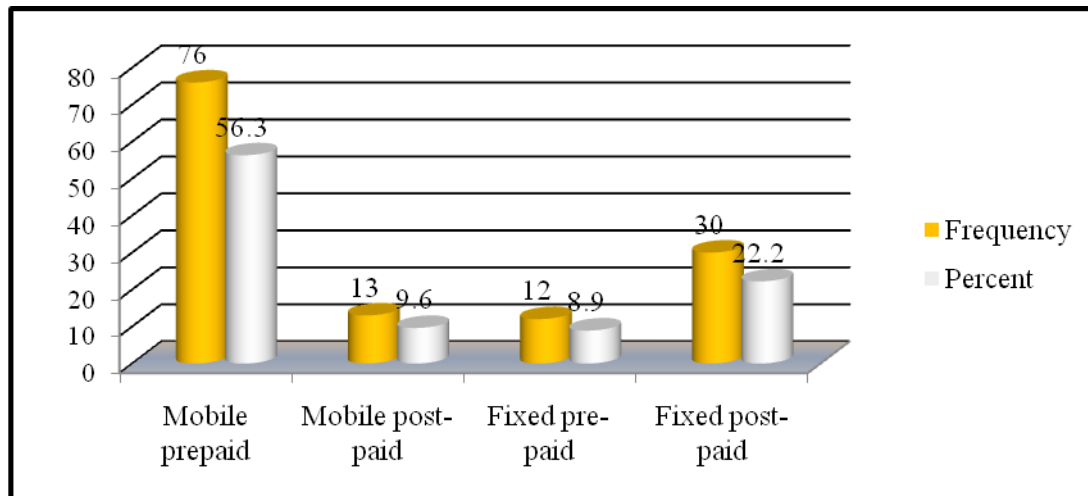
Figure 4.4 reported; 0-1 year 36 (26.7%); 2-3 years 45 (33.3%); 4-5 years 41 (30.4%); and 6 years +13 (9.6%) of data set N = 135. In essence, a relatively more respondents surveyed in the study have enjoyed telecommunication products or services of Vodafone Ghana Plc., for a period ranging between 2-3 years.

This is followed by those who have enjoyed it within a time spans of 4-5 years and 0-1 years respectively. The least reported duration however was found to be those within the time range of 6 years +.

Implied in the foregoing descriptive statistics (as reflected on fig. 4.4) is the notion that, majority of customers of the organisation has not used the telecommunication products or services of the Vodafone Ghana Plc., for a long period of time. It is therefore incumbent on management to devise strategies that can optimize customer satisfaction in order to ensure user loyalty.

#### 4.1.5 Type of customers

The descriptive statistics results obtained from the analysis of the socio-demographic characteristic of type of customers enjoying Vodafone Ghana's telecom products or services have been presented with the aid of a Bar Chart labeled 4.5 below:



Source: Field survey (2016)

Figure 4.5: Bar Chart Showing Type of Vodafone Ghana's Customer (N = 135)

Figure 4.4 reported; Mobile prepaid 76 (56.3%); Mobile post-paid 13 (9.6%); Fixed pre-paid 12 (8.9%); Fixed post-paid 30 (22.2%) of data set N = 135. The implication here is that, majority of customers enjoying the products and services of the organisation are found to be mobile pre-paid customers.

## 4.2 Nature of computerized trouble ticketing system in Vodafone Ghana Plc

The study explored the nature of computerized trouble ticketing system in the context of Vodafone Ghana Plc. Data collected in this direction has been analyzed, the results of which have been presented as follow:

### 4.2.1 Experience of troubles in using Vodafone Ghana's services

The study inquired from respondents, who were mainly customers whether they experience troubles (faults) when using Vodafone Ghana's telecom products or services. The analyzed results obtained thereof have been presented in table 4.1 below:

**Table 4.1: Experience of Troubles (N = 100)**

<b>Response</b>	<b>Frequency (N)</b>	<b>Percent (%)</b>
Yes	73	73.0
No	27	27.0
<b>Total</b>	<b>N = 100</b>	<b>100.0</b>

**Source: Field survey (2016)**

Table 4.1 measured respondents' experience of troubles (faults) in the usage of Vodafone Ghana Plc's services. It simply reported: Yes 73 (73.0%) and No 27 (27.0%) of the data set N = 100.

The results (as reflected in Table 4.1) above indicated that, majority of people who enjoy the telecommunication products or services of Vodafone Ghana Plc., do encounter some troubling issues that need attention.

#### 4.2 2 Reporting of troubles to Vodafone Ghana

The study further wanted to ascertain from customers whether they report troubles (faults) when using Vodafone Ghana's telecom products or services. The results obtained have been presented in table 4.2 below:

**Table 4.2: Reporting of Faults to Vodafone Ghana Plc. (N = 100)**

<b>Variables</b>	<b>N</b>	<b>%</b>
Help desk	42	42.0
Service desk	58	58.0
<b>Total</b>	<b>100</b>	<b>100.0</b>

**Source: Field survey (2016)**

Table 4.2 indicated two categories measured with the variable, which sought to measure where customers report faults they experience when utilizing Vodafone Ghana Plc's telecom products or services. It statistically reported: Help desk 42 (42.0%) and Service desk 58 (58.0%) of the data set N = 100.

In essence, majority of customers of Vodafone Ghana Plc tends to report the troubles or issues they have with the usage of products or services through the use of service desk centre in the organisation.

More significantly, this current research findings confirmed service desk as been a typical example of trouble ticketing system, which tends to provide the customer or end user with information and support related to a company's products or services (Goyal, 2010; Rainer & Cegieski, 2009).

### 4.2.3 Rating of Vodafone Ghana Plc.'s computerized trouble ticketing

Table 4.3 reported the ratings of customers who were asked to rate the computerized trouble ticketing systems through which they make their troubles known.

**Table 4.3: Rating of Trouble Ticketing System at Vodafone Ghana (N = 100)**

Rating scale	N	%
Good	14	14.0
Fair	64	64.0
Poor	11	11.0
Very poor	11	11.0
<b>Total</b>	<b>N= 100</b>	<b>100.0</b>

**Source: Field survey (2016)**

Table 4.3 basically indicated; good 14 (14.0%); fair 64 (64.0%); poor 11 (11.0) and very poor 11.0%). In this sense, it can be inferred that, most customer using telecommunication products or services of the company found them to be fairly delivered.

Regardless, cumulative percent of about 22.0% of surveyed customers reported “poor” 11 (11.0%) and very poor 11 (11.0%). This is a matter of great concern to management, especially in today’s era of intense competition in telecom space in Ghana. As a result, stakeholders must give due attention to resolving customers’ perception of services as been poor and very poor respectively.

#### 4.2.4 Improvement in services over the years

Table 4.4 below provided statistics results of customers' views, opinions and ideas regarding whether telecom products or services of Vodafone Ghana Plc's have improved when compared to previous years.

**Table 4.4 Improvement in Vodafone Ghana's Services (N = 100)**

<b>Response scale</b>	<b>N</b>	<b>%</b>
Somewhat disagree	19	19.0
Disagree	67	67.0
Somewhat agree	14	14.0
<b>Total</b>	<b>N = 100</b>	<b>100.0</b>

**Source: Field survey (2016)**

Table 4.4 displayed above indicted three variables measured within the variable, which sought measure whether there has been improvement in telecom service delivery of Vodafone Ghana Plc., over the years. It reported: somewhat disagree 19 (19.0); disagree 67 (67.0%); and somewhat agree 14 (14.0%).

The results (as reflected in Table 4.4) suggested respondents' disagreement that the services of Vodafone Ghana Plc., have improved significantly over time. This accounted for the majority percent of about 67 % out of the total sample of customers, who disagreed to item number 10 (as indicated in questionnaire in Appendix A).

### 4.3 Inherent benefits in using computerized trouble systems in Vodafone Ghana Plc

The study wanted to ascertain the inherent benefits of utilizing computerized trouble ticketing systems in telecom turf. The analyzed results obtained from descriptive analysis of related data have been presented in Table 4.6 below:

**Table 4.6: Inherent Benefit in Trouble Ticketing System (N = 35)**

<b>Variables</b>	<b>N</b>	<b><u>M</u></b>	<b>S.D</b>
Customer satisfaction	35	4.11	.583
Competitive advantage	35	4.09	1.197
Business intelligence	35	3.80	.868
Customer retention	35	3.49	.507
Reduction cost of operations	35	3.20	.677
<b>Total valid sample (N)</b>	<b>35</b>		

**Source: Field survey (2016)**

Table 4.6 indicated computed total valid sample (N), mean (M), and standard deviations (S.D) for five variables. These descriptive statistical results have been arranged in descending order of merit

It statistically reported respondents' total agreement that effective and efficient use of computerized trouble ticketing system in Vodafone Ghana Plc., ensures the inherent benefits of customers' satisfaction. This is amply evidenced by the mean score of 4.11, which indicated respondents' agreement, and standard deviation of .583) that suggested variations in the responses of respondents.

Again, the results (as reflected in Table 4.6) indicated respondents' agreement that it has inherent benefit of giving the company competitive advantage. This claim is supported by the mean score of 4.09, which showed total agreement.

The corresponding standard deviation score of S.D = 1.197 further gave indication of a relatively wide variation in the kind of responses been provided by the respondents. Likewise, the results showed units of analysis' agreement of enhancing Business intelligence. Similarly, this was substantiated by the mean score value of 3.80 (i.e. agree), with standard deviation of .868 of the data set N = 35.



Conversely, the results (as indicated in Table 4.6) also established respondents' neutrality in ascertaining whether an effective and efficient use of computerized trouble ticketing system ensures customer retention ( $M = 3.49$ , with  $S.D = .507$ ), and reduction of cost ( $M = 3.20$ , with  $S.D = .677$ ) or otherwise.

These findings analytically lend credence to the assertions in the extant literature that opined among others that; today, the use computerized trouble ticketing systems in competitive marketing environment ensures customer satisfaction (Lamb *et al.*, 2008); competitive advantage (Boone & Kurtz, 2006), and business intelligence (Rainer & Cegielski, 2011; Goyal, 2010).

Nevertheless, the findings fails to ascertain Turnbull *et al.*'s (2002) contestations, computerized trouble ticketing systems tend to ensure customer retention and cost reduction.

#### 4.5 Challenges in use of computerized trouble ticketing system

The study wanted to identify the major challenges which tend to thwart the smooth utilization of computerized trouble ticketing systems in telecommunication environment. Table 4.7 below displayed the results obtained from the descriptive statistical analysis of related data collected from 35 respondents in the field.

**Table 4.7: Challenges in Using Trouble Ticketing System (N = 35)**

<b>Variables</b>	<b>N</b>	<b><u>M</u></b>	<b>S.D</b>
Complexity in Managing Data	35	4.94	.338
Intense Competition in telecom environment	35	4.60	.553
High cost of trouble ticketing systems	35	4.49	.507
Rapid changes in technologies in telecom	35	4.31	1.132
<b>Total valid sample (N)</b>	<b>35</b>		

**Source: Field survey (2016)**

Table 4.7 indicated computed total valid sample (N), mean (M), and standard deviations (S.D) for four variables. These descriptive statistical results have been arranged in descending order of merit.

Detail wise, it statistically reported: complexity in managing data (M = 4.94, with S.D = .338); intense competition in telecom market (M = 4.60, with S.D = .553); high cost of trouble ticketing system (M = 4.49, with S.D = .507); and rapid changes in technologies (M = 4.31, with S.D = 1.132).

More importantly, the foregoing results suggested respondents' total agreement that, the major challenges, which tend to thwart the smooth use of computerized trouble ticketing systems concerned the phenomena of complexity in managing volume of data generated in using CTTs.

Mostly what compounds the problem also include the issues of intense competition, cost of CTTs and rapid technological obsolescence, especially, when it comes to telecommunication arena. In fact, these findings are in tandem with other existing studies that reported same.

## 4.6 Discussions

Thus by far, it can be recognised that the current findings tend to substantiate most of the existing studies. More importantly, the study confirms the claim that an effective and efficient utilisation of computerized trouble ticketing systems tend to facilitate customer satisfaction (Lamb *et al.*, 2008) competitive advantage (Rainer & Cegielski, 2011) and business intelligence and so forth

The crux of the matter is that, the current study lends credence to the importance of establishing the importance of replicability in scientific enterprise, as this current finding also tended to confirm other existing studies.

In particular, the current research findings add to available research knowledge by contextualization of the study in Ghanaian telecommunication turf, which if also challenged by complexities in data management, intense competition, high cost of CTTSs technologies and rapid technological obsolescence.

It is imperative therefore for Vodafone Ghana Private limited company and other stakeholders involved in telecommunication to come out with cutting-edge strategies which can optimize the use of computerized trouble ticketing systems in order to realize the company's bottom-line goal of enhancing key performance indicators (KPIs), such as customer satisfaction for customer attraction, retention.

## **CHAPTER FIVE**

# **SUMMARY OF FINDINGS AND RECOMMENDATIONS**

## **5.0 Introduction**

The study rounded off with a succinct outline of summary of findings, conclusions and recommendations. These are premised on the results obtained from the descriptive statistical analyze of a cross section of quantitative data set collected from research subjects from the field.

## **5.1 Summary of findings**

Careful consideration of results obtained from analyses of cross of data collected from sampled cohorts of respondents, including customers and employees of Vodafone Ghana Plc revealed certain vital statistics which are worthy of note.

### **5.1.1 Socio-demographics**

The analysis of vital socio-demography of respondents revealed that Vodafone Ghana Plc.'s products and service usage is mostly dominated by male customers and employees, majority of whom are within the age cohorts of 15 to 25 years. Mobile telephony enjoys maximum patronage. It is dominated by mobile prepaid customers who have been using its services for a period ranging between 2-3 years.

### **5.1.2 Nature of CTTs**

The study noted customers who experience troubles in their usages of products or services of the telecom company. These faults are mostly reported to the company's service desk clerks, whose responses toward addressing troubles have been described as fair. But, in many ways, respondents disagreed to perceived improvement in service delivered to them.

### **5.1.3 Inherent benefits of CTTs**

The study revealed that, the right usages of computerized trouble ticketing system in the company tend to presents a number of inherent benefits including: customer satisfaction; competitive advantage and acquisition of business intelligence. The study however failed to ascertain whether the company accrues the benefits of customer retention and reduction of operational cost or otherwise.

### **5.1.4 Challenges in using CTTs**

Regardless, the smooth use of computerized trouble ticketing system in the company is constantly thwarted by major challenges, including complexities in managing volumes of data generated by CTTs, intense competition in telecom market, high cost of procuring CTTs technologies, as well as, rapid changes in CTTs applications in the market.

## **5.2 Recommendations**

The study recommends the following outlined measures for quick adoption in order to help address the myriad of challenges, which mostly tend to thwart the smooth realization of the inherent benefits in the utilization of computerized trouble ticketing system in the context of telecommunication arena.

### **5.2.1 Differentiation strategy**

First, since there is evidence of inequalities in gender representation in terms of customer base of the company, the study recommends for the adoption of gender neutral marketing strategy that can appeal to both gender equally.

The company for instance can devise differentiation strategy. This will help introduce new products and services, add new features to existing ones in order to attract females to patronize the brands. For instance, colours such as purple and pink that are found to be female oriented colours can be used to brand their products and services.

### **5.3.2 Cost leadership strategy**

The study revealed high cost of CTTS applications in the midst of rapidly changing technological world. Hence, the study recommends for the adoption of cost leadership strategy. To do this, management of Vodafone Ghana should use its size as economy of scale and come out with products or services at the lowest cost in the industry. This in the long run will help reduce inventory storage requirements that result from non-patronage of products in storage due to high costs

### **5.3.3 Customer relationship management**

Clearly, customers are vital major stakeholders of any forward thinking telecommunication organisation since they form the basis of the market. As a consequence, they need to be treated with care like kings and queens. To achieve this, the study recommends for the swift adoption of customer relationship marketing.

This is an organisational strategy that is customer-focused and customer driven. To accomplish this, the company should concentrate on satisfying customers by assessing their requirements for products and services, and then providing high-quality, responsive customer service. It is noteworthy that, CRM is not a technology per se; rather, it is observed to be a new way of thinking and acting in a customer-centric fashion.

In sum, it is envisaged that, if these foregoing recommendations are strictly adopted for implementation, it will invariably go a long way to help Vodafone Ghana Plc., recognise its prospective and loyal customers as the core of a successful enterprise, whose loyalties and retentions depend on effectively managing relationship with them. In turn, it will build sustainable long-term customer relationships that can create value for the company, as well as, for the customer.

## **CHAPTER SIX**

# CONCLUSION AND FUTURE WORK

## 6.0 Introduction

The study concludes with the chapter six that presents conclusions and suggestion for future work.

## 6.1 Conclusions

Based on the analysis of a cross section of data set collected and critically subjected to rigorous and robust descriptive analysis with the aids of SPSS and Excel, the study can make the following empirically based conclusions:

- i. There is inequality in gender representation in the market size of the company. This is skewed in favour of males.
- ii. The nature of CTTSSs is characterized by customers' experience of faults that are reported to service desks, whose response towards addressing such troubles can be described as fair, but no substantial improvement over the years.
- iii. CTTSSs ensure customer satisfaction, competitive advantage and acquisition of essential business intelligence in telecom arena.
- iv. Usage of CTTSSs is often challenged by complexity in data management, intense competition in telecom market, amid high costs of CTSSs application in a rapidly changing technological world.

## 6.2 Suggestion for future research

The study recommends for future study to be conducted in the area of impact of technological obsolesce on the use of computerized trouble ticketing systems in competitive telecom environment.

This will equip stakeholders with the requisite knowledge needed to assess the real impact will rapid technological changes tends to have on telecommunication industry in the 21<sup>st</sup> century.



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# APPENDIX A

## QUESTIONNAIRE FOR COLLECTION OF DATA ON COMPUTERIZED TROUBLE TICKETING SYSTEM AND ITS INHERENT BENEFITS IN VODAFONE GHANA TELECOMMUNICATION COMPANY

Dear respondent:

This questionnaire is intended to be used to collect quantitative data on computerized trouble ticketing system in Vodafone Ghana Telecommunication Company. This is a requirement in partial fulfillment of an award of Master's degree in Informatics at Blekinge Institute of Technology in Sweden. It is to be used for academic purposes only. Your candid responses are therefore needed. You are promised the needed confidentiality, privacy, safety and anonymity you deserve. Thank you for your voluntary consent.

---

Instruction: Please, this will take few minutes of your time. You are therefore entreated to tick like this [] as your answer where response boxes are provided. Write the space provided where you are told to do so.

### SECTION A: SOCIO-DEMOGRAPHICS OF RESPONDENTS (*NB: To be answered by all respondents*)

**1. Gender of respondent:**

- a.  Male
- b.  Female

**2. Age group of respondent:**

- a.  15-25 years
- b.  26-35 years
- c.  36-45 years
- d.  46 years & above

**3. Telecommunication product or service enjoyed by respondent:**

- a.  Fixed telephony
- b.  Mobile telephony
- c.  Internet connections
- d.  Roaming
- e.  Others

**4. How long have you been using Vodafone Ghana Telecom's product or service?**

- a.  0-1 year
- b.  2-3 years
- c.  4-5 years
- d.  6 years or +

**5. Customer type:**

- a.  Mobile pre-paid
- b.  Mobile post-paid
- c.  Fixed pre-paid

- d.  Fixed post-paid
- e.  Others

**SECTION B: NATURE OF COMPUTERIZED TROUBLE TICKETING SYSTEM  
(NB: To be answered by customers only)**

**6. Do you find trouble (fault) with the use of Vodafone telecom's product or services?**

- a.  Yes
- b.  No

**7. Where do you report fault encountered to Vodafone Ghana?**

- a.  Help desk
- b.  Service desk
- c.  Asset management system
- d.  Others

**8. Does the organisation have computerized trouble ticketing system that manages and maintains you report?**

- a.  Yes
- b.  No

**9. How will you rate the computerized system used to resolve faults by Vodafone Ghana?**

- a.  Very good
- b.  Good
- c.  Fair
- d.  Poor
- e.  Very poor

**10. Do you notice improvement in computerized support system in Vodafone Ghana when compared to previous years?**

- a.  Strongly agree
- b.  Somewhat disagree
- c.  Disagree
- d.  Somewhat agree
- e.  Strongly agree

**SECTION C: INHERENT BENEFITS OF COMPUTERIZED TROUBLE TICKETING SYSTEM (NB: *To be answered by employees of Vodafone Ghana only*)**

Instruction: Use the following numbers which correspond to the categories under questions 11 –15 as your answer in the box labeled: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree.

No.	Item Description	1	2	3	4	5
11	Trouble ticketing system gives the company competitive advantage					
12	Trouble ticketing system serves as business intelligence					
13	Trouble ticketing system helps reduce cost of operations					
14	Trouble ticketing system ensures customer satisfaction					
15.	Trouble ticketing system helps in retention of new and old customers					

**SECTION D: MAJOR CHALLENGES IN EFFECTIVE USE OF COMPUTERIZED TROUBLE TICKETING SYSTEMS**

Instruction: Use the following numbers which correspond to the categories under questions 16 – 20 as your answer in the box labeled: 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. Use the question below to answer items 16-19:

**Question:** Which of the following is the major challenge in using Trouble Ticketing System by Vodafone Ghana?

No.	Item Description	1	2	3	4	5
16.	Complexity in data management					
17.	Rapid changes in technology of trouble ticketing systems					
18.	High cost of using trouble ticketing system					
19.	Intense competition in telecom market in Ghana					
<b>MEASURES FOR ADDRESSING CHALLENGES IN THE USE OF TROUBLE TICKETING</b>						
20.	Effective use customer relationship management					
21.	Quality training and development of employees in data management					
22.	Procurement of quality trouble ticket systems					

Thanks you.

## **SAMPLE OF CONSENT FORM**

Dear respondent / participant:

Please, this questionnaire is intended to be used to collect quantitative data on the issue of computerized trouble ticketing system in Vodafone Ghana Plc. This is a requirement in partial fulfillment of an award of Master's degree in Informatics at Blekinge Institute of Technology in Sweden.

It is to be used for academic purposes only. Your candid responses are therefore needed. You are promised the needed confidentiality, privacy, safety and anonymity you deserve. It will take few minutes of you time. You have the choice to voluntary participation. Thank you for your voluntary consent.

Researcher:

Jerome Gilles Akama – Kisseh