# COMPETITION AND EMPLOYMENT IN THE TELECOMMUNICATIONS INDUSTRY IN TANZANIA

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# COMPETITION AND EMPLOYMENT IN THE TELECOMMUNICATIONS INDUSTRY IN TANZANIA

By

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**A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree of Masters of Arts (Economics) of the University of Dar es Salaaam**

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# CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by the University of Dar es Salaam the dissertation entitled: ***Competition and Employment in the Telecommunications Industry in Tanzania***, in partial fulfilment of the requirement for the degree of Masters of Arts (Economics) of the University of Dar es Salaam.

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Dr. G. Kahyarara

(Supervisor)

Date: ……………………………..

# DECLARATION

# AND

# COPYRIGHT

I, **Achilana Mkunga Mtingele**, declare that this is my own original work and not part or whole has been copied from any other work submitted elsewhere whether for academic or any other purpose.

**Signature** _____

# ACKNOWLEDGEMENT

# DEDICATION

To my son, Humphrey Mkunga Mwaimu, for being my inspiration to work harder; I also

dedicate this work to my parents Humphrey and Rose and my siblings Sangalala,

Mkunga, Ntukano and Mwaimu.  You have always been by my side through good and

trying times of my studies.

# ABSTRACT

This dissertation examines the impact of competition on employment in the telecommunications industry in Tanzania. Specifically, it addresses the question "Does competition in telecommunications industry in Tanzania have any significant impact on employment?" Furthermore, the competitive pressure existed in the industry after liberalization in the 1990s is what induced the study. The panel data available for this dissertation over the period of seventeen years, allows estimation of competition and levels of employment that control for firm fixed effects. The model estimated relies on employment equation that uses competition variable measured by Herfindhal-Hirschman Index as one of the regressors. The findings based on OLS estimates indicate that 1 per cent increase in competition increases employment by 1.02 per cent but the coefficient estimate is not significant, partly suggesting biasness of OLS. When firm fixed effects are controlled for, the model demonstrates robust positive correlation between competition and employment; 1 per cent increase in competition increases employment by 0.66 percent; these results are highly significant at 5 per cent. Such results suggest that OLS estimates are indeed biased. The dissertation concludes significant positive correlation between employment and competition hence recommends for more efforts to support employment creating competition.

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## LIST OF PRINCIPAL ABBREVIATIONS

TTCL        Tanzania Telecommunications Company Limited

TCRA        Tanzania Communications Regulatory Authority

FCC         Fair Competition Commission

HHI         Herfindahl-Hirshman Index

CR          Concentration Ratio

CDMA        Code Division Multiple Access

GSM         Global System for Mobile communications

TCC         Tanzania Communications Commission

OECD        Organisation for Economic Cooperation and Development

OLS         Ordinary Least Squares

# CHAPTER ONE

# INTRODUCTION

This dissertation sets out to assess the employment effects of competition in telecommunications industry of Tanzania. The rationale behind the study stems from increased competition in the industry that adversely affects the labour market. Specifically for Tanzania since 1990s competition has intensified. While there are potential employment effects from the intensified competition, there is lack of adequate knowledge about employment effect of such competition. This dissertation is an attempt to contribute knowledge in this area. It will be recalled that during the post independence period, Tanzania had put in place protectionist measures for infant industries which hindered competition in different industries. Besides, the economic performance was not very satisfactory for a number of reasons including this issue of lack of competition. The macroeconomic reforms introduced in the 1980s in Tanzania had the intention to liberalise the economy and hence open up room for competition but the reforms did not perform as expected. Currently Tanzania is putting in efforts for competition policy to ensure and maintain fair competition amongst investors and producers, protecting consumer welfare and laying groundwork for national competitiveness in the global context.

In Tanzania, as well as in many other parts of the world, telecommunications was a national monopoly; the service was provided by only one state owned company.

Tanzania Telecommunication Company Limited (TTCL) used to provide fixed line telephone service nationwide.  This company held a monopoly in providing telecommunications services in Tanzania until the licensing of Mobitel (now Tigo).  By 1996, Mobitel (then Buzz) started to offer GSM telecommunications services followed by Vodacom (1999), Celtel (2001) (now Airtel), Zantel (2005), TTCL Mobile (2006), Sasatel (2009), and Benson (2000); while Tritel (1996) went bankrupt and had its license revoked in 2003.  Among the currently operating companies, only three companies hold more than 90% of the total market share.  Vodacom is the leading network which had about 7,274,987 subscribers nationwide by March 2010, Airtel seconds Vodacom by far having 4,699,412 subscribers and Tigo 4,295,862 subscribers.  While the other networks had the following market shares by March 2010; Zantel 1,432,172; TTCL 265,471; Sasatel 14,825; and Benson 3,190 subscribers.

Trends of employment in the industry show that there are no significant increases or decreases in employment, the levels remain more or less the same.  However, statistics show that competition is increasing as the number of companies increase in the industry, the question remains, is this competition good or bad for employment?  Is it significant?  To examine this, the researcher uses panel data on the telecommunications companies to check for the overall and the firm specific effects of competition.  There has been an exponential growth of the total number of subscribers in the market from less than 500,000 in the 1990s to more than 21,000,000 at present.

## 1.1. Statement of the Problem

The key problem addressed by this dissertation is the employment effect of competition in Tanzania telecommunications industry. Knowledge about this is important because, competition in an industry affects the labour market. As companies compete, they strive to gain a larger market share than their opponent(s) and hence lager profits. In doing so, companies tend to produce more and better products/services to attract customers. Because labour is an input in the production process, the companies therefore have to employ more so as to increase production. A company that is more competitive is likely to employ more people than a less competitive company because it has to maintain its status and is likely to pay better. Also, a company that once did well, when it loses it is likely to contract employment and the one that is gaining a competitive advantage is likely to expand employment.

Given the increasing trends in competition among the telecommunications companies in Tanzania, it is expected that these companies should be employing more as competition stiffens in the market. The main question is therefore, does competition in the telecommunications industry really affect employment status in Tanzania? And if so, to what extent and what is the net effect?

The study uses panel data collected on various telecommunications companies in Tanzania over time. The data has rich information on the level of competitions of these

companies considering their market shares and the level of employment these companies have generated. The data is obtained from Tanzania Communications Regulations Authority (TCRA) and the respective telecommunications companies.

## 1.2. Objectives and Significance of the Study

### 1.2.1. Objectives of the Study

The key objective of this study is to analyse the extent to which competition in the telecommunications industry affects employment in Tanzania. Such an objective is split into four specific objectives. These are:

   i.    To examine the relationship between competition and firm level employment in Tanzania telecommunications industry,

   ii.    To evaluate the types of jobs created or destroyed from the increased competition in the telecommunications industry in Tanzania,

   iii.    To analyse if there are gains from employment from the increase in competition in the Tanzania telecommunications industry, and

   iv.    To recommend the best way of ensuring positive employment effect from competition in telecommunications industry.

### 1.2.2. Significance of the Study

This study is significant in academics to fill the literature gap in relating competition in telecommunications industry and the labour market. It is also significant for policy recommendations so that policies made should take into account competition in telecommunications industry in Tanzania in employment policies and telecommunications policies.

### 1.2.3. Scope and Limitations

The study covers the seven telecommunications companies in Tanzania that is Vodacom, Airtel, Tigo, Zantel, Sasatel, TTCL, and Benson. The study is limited by the time allocated to complete it and the availability of data from the companies in question.

### 1.3. Organisation of the Report

The next chapter presents the telecommunications environment in Tanzania context. Chapter three presents literature reviewed on areas related to this study including theory on the matter as well as the empirical studies done on this subject. It also brings out the gap that needs to be filled. Chapter four shows the methodology of the study: data used in this study and the method of model estimation employed. Chapter five present the results and findings of this study and their interpretation. Finally Chapter six sums up by suggesting policy recommendations and areas for future studies on the subject.

# CHAPTER TWO

# THE TELECOMMUNICATIONS INDUSTRY OF TANZANIA:      AN OVERVIEW

This chapter gives an overview of the telecommunications market in Tanzania. It explains the key players in the market, their market shares, and the activities they engage in. It is divided into seven sub-chapters, the first one explains the general telecommunications industry in Tanzania, its evolution up to the present state, the second presents the competition situation in the industry, the third is about the types of jobs in this industry while the fourth is about regulatory bodies or authorities followed by the policies and laws and acts governing competition in the industry; lastly the chapter is summarized.

## 2.1. The Telecommunications Industry in Tanzania

The telecommunications industry in Tanzania is comprised of seven companies TTCL, Tigo, Vodacom, Airtel, Benson, Zantel, and Sasatel. Vodacom, Airtel, and Tigo are the three companies which currently hold about 90 per cent of the market share with more than 16 million subscribers out of the total 17 million subscribers nationwide. The sector was the fastest growing in 2009 at a rate of 20.9 per cent while in 2008 it grew at 20.5 per cent; its contribution to GDP was 2.1 per cent while in 2008 it was 2.5 per cent.

### 2.1.1. Tanzania Telecommunications Company Limited (TTCL)

TTCL emerged from the Tanzania Posts and Telecommunications Corporation (TPTC-1978) after the dissolution of the East African Community in 1977. Measures to liberalise the communications sector in Tanzania led to the split of the TPTC in 1993 forming Tanzania Posts Corporation (TPC), the Tanzania Telecommunications Company Limited (TTCL) and the Tanzania Communications Commission (TCC).

The TTCL was established by the Tanzania Telecommunications Company Incorporation Act of 1993 and started operating in 1994. It was established to develop and operate telecommunications service within and outside Tanzania. TTCL used to provide fixed landline telephone services alone in Tanzania. In the year 2001, TTCL was partly privatised and MSI of the Netherlands and Detecon of German acquired 35% share of the company from the Government of Tanzania and the government remained with the remaining 65% of the shares. TTCL currently offers services such as fixed landline telephone services, mobile services (TTCL mobile), and data services (broadband). This company held a monopoly in providing telecommunications services in Tanzania until the licensing of Mobitel Tanzania in 1994. As of March 2010 TTCL had a total of 265,471 subscribers nationwide.

### 2.1.2. Millicom Tanzania Limited (TIGO)

This company is owned by MIC (Milcom International Cellular S.A.) Tanzania Limited. This is the oldest wireless telecommunications company in Tanzania which started out as Mobitel in 1994. The company started by offering CDMA (analogy) services until 2001 when it started offering GSM (digital) services, it was then known as Buzz network. When it started operating, it was partially state owned offering analogue ETACS network in Dar-es-Salaam alone before expanding to other regions in the country.

Tigo has more than 30 million customers in 13 emerging markets in Africa and operates in Tanzania mainland and Zanzibar with more than 4,295,862 customers nationwide. Tigo operates on a strategy they call "Triple A" strategy that is Affordability, Accessibility and Availability.

Tigo offers services such as Tigo PESA which is for money saving and transfer and it also enables customers to buy airtime credit from their accounts; caller tunes, data connections through modems, as well as social services to the society now that they have a school bus to help some of the students around the city of Dar es Salaam.

### 2.1.3. Tanzania Tri-Telecommunications (TRITEL)

Tritel was a Siemens based GSM (digital) cellular mobile network in Dar-es-Salaam and Zanzibar, which planned to expand its operations to Arusha and Mwanza. This company was Malaysian owned where by TRI Malaysia held 65 per cent of the shares and VIP Engineering Limited the remaining 35 per cent. It started operating in the year 1996. Tritel went bankrupt in less than three years of operation and was hence officially closed in January 2003. This was the first GSM operator in Tanzania but it could not pay its debts to TCC and TRA worth billions of Tanzanian shillings. By 1998 Tritel had about five thousand subscribers with a capacity to serve 20,000 subscribers.

### 2.1.4. Vodacom Tanzania

Vodacom was licensed in 1999 in Tanzania. It is a subsidiary of the Vodacom Group (Pty) Limited of South Africa Vodacom which owns 65% of the company shares and the remaining 35% is owned by Mirambo Limited, a Tanzanian shareholder. It started operating in year 2000 having about one million customers. The company has continued to grow by introducing more services and gaining more customers. In 2006 Vodacom Tanzania was granted three major service licenses which are Network Facilities License, Network Services License and Application Services License with the authority to provide voice and data services combined both nationally and internationally. This increased their investments and led to a more focused provision of communication

services to Tanzanians. By 2007, Vodacom had three million customers nationwide and was the first network to reach such a number of subscribers. Currently Vodacom is now a leading telecommunications company offering its services to more than seven million customers in the country.

Vodacom Tanzania operates in all regions of Tanzania but some of its technologies are available for its customers in only a few regions. Some of the services and Products currently offered by Vodacom Tanzania are voice calls, SMS, M-PESA (financial service to send and receive or save cash as well as bill payment to subscribed companies), data (internet) service, credit transfers, TUZO points and TUZO *droo*, talk packages, MMS, Media and entertainment. It Tanzania is also involved is corporate social responsibility such as Vodacom Foundation which supports Tanzanians especially the disadvantaged and marginalised ones. It carries out different projects in education, health, economic empowerment and social welfare.

### 2.1.5. Airtel Tanzania

Airtel is a telecommunications company in Tanzania which started as Celtel Tanzania then changed to Zain Tanzania before becoming Brahti Airtel Tanzania limited. Celtel came into existence as a result of partial privatisation of TTCL in 2001 where by MSI (Celtel International) of the Netherlands and Detecon of German acquired 35% of the shares of the Government of Tanzania in TTCL. This was the outcome of the poor

financial situation of TTCL in year 2000. In August 2005, Celtel Tanzania and TTCL were officially separated and each one administered its own financial and business operations. By 2007 Celtel had the widest network coverage in all of Tanzania and one which is available in many rural areas. Celtel changed its brand name to Zain Tanzania in year 2008. Zain is a Kuwait based company established in 1983 as MTC (Mobile Telecommunications Company). Zain (now Airtel) operates in Middle East and Africa with over 35.5 million customers. In Tanzania Airtel (launched in November 2010) have about 4,699,412 subscribers and it offers services such as voice calls, SMS, MMS, data services and financial services.

Just like the other companies, Airtel offers services such as voice call, data connections through modems, MMS, SMS, and it also helps in different problems of society including sponsoring outstanding students for further studies. It holds Africa challenges for university students to keep them up to date with the history of the world as well as emerging issues in different subjects including sports, economics, biology and many other subjects.

### 2.1.6. Zantel

Zantel (Zanzibar Telecom Limited) started operating in Zanzibar in year 1999 with Etisalat (Emirates Telecommunications Company-1976) as the majority shareholder having 51% of the company shares. Zantel expanded its operations to Tanzania

mainland in the year 2003. Zantel now has about 1,432,172 customers in Tanzania mainland and Zanzibar. It also offers services such as voice calls, SMS, MMS, data and mobile banking (financial services) to its customers. Zantel also offers services such as SMS, MMS, voice call, and data connections. It also offers Z-Pesa which is a financial service to Zantel customers for saving and sending as well as receiving money.

### 2.1.7. Sasatel

Sasatel by Devoted Limited is a mobile telecommunications company operating in Dar-es-Salaam region alone. It launched its operation in June 2009 and it now has 14,825 subscribers in Dar-es-Salaam. This network also offers services such as SMS, voice calls, and data services. This is the newest firm in the telecommunications business in Tanzania and it plans to expand its services given the opportunity and plans in place because so far its licence is to operate a CDMA network in Dar es Salaam alone.

### 2.1.8. Benson

Benson Informatics Limited was founded in January 2000 as multidisciplinary strategic and technology company providing services to Corporate, Government and Civilian clients in the country. The company introduced the first wireless internet connection in Africa and it currently operates in Dar-es-Salaam and Arusha only with 3,190 customers. Benson Company also offers SMS, data services and internet services to its customers. Benson is another small company in the market even though it started

operations even before Airtel. This company also plans to expand its services and currently it still operates under CDMA network in the two regions.

## 2.2. Competition in the Telecommunications Industry in Tanzania

Like in many countries in the world, telecommunications was only a government monopoly until the liberalization of the market in the 1990s. The liberalization of the market opened room for private enterprises to invest in the telecommunications industry making many of the nations' telecommunications monopolies to lose their monopoly powers. The telecommunications market became more competitive as more and more firms entered the market. In Tanzania the telecommunications industry is no longer a monopoly market, the competition index indicates that the market is far from a monopoly one. Though not perfectly competitive, the level of competition is reasonably higher than it was before 1994. Some anticompetitive practices include: price fixing where competitors agree to charge the same or similar prices; market sharing which occurs when competitors agree to restrict territories, customers or business operators; boycotts or actions taken by two or more competitors to prevent another from acquiring or receiving goods and services; misuse of market power to damage or eliminate a competitor; exclusive dealing where arrangements are made to restrict a business in purchasing or supplying goods or services; refusal to supply goods or services; Resale price maintenance or the setting of minimum prices by suppliers to prevent businesses from discounting.

Moreover, Electronic and Postal Communications Act 2010 of Tanzania states some of the anti-competitive conducts which are punishable by law are: Eliminating or substantially damaging another licensee in the market it operates or any other; preventing entry of any other person in that market or any other market; deterring any other licensee from engaging in competitive conduct in that or any other market; discriminating customers in terms of fees, service quality and the form or condition of service

## 2.3. Types of Jobs in the Telecommunications Industry

In the telecommunications industry in there are different types of jobs from directors, managers, secretaries, engineers, technicians, accountants, auditors, economists, publicists, surveyors, researchers, marketers, sales personnel as well as customer service personnel and other support staff (such as cleaners, driver and messengers). These different kinds of jobs create opportunities for people with different carriers to be employed in the industry. All these kinds of jobs are also offered in the telecommunications industry of Tanzania and Tanzanians have the opportunity to secure jobs matching their carriers. In the United States of America, telecommunications provides more than one million wage and salary jobs. The types of jobs in this industry include installation, maintenance and repair; office and administrative support; professional and related occupations such as engineers and telecommunications specialists; sales and related occupations such as supervisors, retail salespersons and

sales representatives. In Australia 2009 using telecommunications data from 2002 to 2008 a study found that most people in the industry were employed as trade workers followed by telecommunications engineers and technicians. It also indicated that 88 per cent of the workers were aged 20 to 54 the rest being older than 55 or less than 19 years of age. It also found that the sector increased employment and trained employees to up-skill them so as to meet customer needs.

## 2.4. Regulatory Authorities

Regulatory bodies have been put forward by the government of Tanzania to ensure that anti-competitive behaviours are dealt with in the telecommunications market. Anticompetitive behaviour in the market may harm fellow firm or customer welfare. Before 2003, TCC was operating (regulating communications only) separating from the broadcasting authority (Tanzania Broadcasting Commission). The two were merged to form TCRA because some of their operations interacted. These authorities are bodies under the Ministry of Communications and Transport of Tanzania.

### 2.4.1. The Ministry of Communications and Transport of Tanzania

The vision of this ministry is to provide efficient transport and communications infrastructure in and services Tanzania with a mission to provide effective international transport and communications services. Its functions include overseeing communications and transport policies and their implementations, licensing of firms in

the regulated sectors, developing human resource under the ministry, overseeing ministerial departments, parastatals and projects under the ministry as well as coordinating government agencies under it.

## 2.4.2. Tanzania Communications Commission (TCC)

This was established in the year 1994 under the Tanzania Communications Act No. 18 of 1993. It was formed after the termination of the Tanzania Posts and Telecommunications Corporation when the government decided to restructure the communications sector. Its responsibilities are to regulate the activities of the communications service providers in posts and telecommunications, to define interconnection and tariff policies, to allocate and monitor radio frequencies, and to prepare numbering plans, revenue sharing arrangements and to monitor compliance with standards. It also has a role of promoting competition in the provision of telecommunications services and approving equipments suitable for use in the provision if telecommunications services. Before the establishment of TCC, Tanzania Posts and Telecommunications Corporation (TPTC) which was created in 1977 was the one responsible for regulation of these activities. TCC has a mandate to promote the development of rural telecommunications in Tanzania. This commission became defunct in 2003 on the establishment of TCRA.

### 2.4.3. Tanzania Communications Regulatory Authority (TCRA)

TCRA was established by the TCRA Act No. 12 of 2003 as an independent authority for postal, broadcasting and electronic communications industries in the United Republic of Tanzania. It is a merging of the former Tanzania Communications Commission and Tanzania Broadcasting Commission with the role of licensing and regulating postal, broadcasting and electronic communications services in Tanzania. The authority became operational in November 2003 taking over the functions of the two defunct commissions. Its specific responsibility is to ensure Tanzanian's welfare through the promotion of effective competition and economic efficiency; protecting the interests of consumers; promoting the availability of regulated services; licensing and enforcing conditions of broadcasting, postal and telecommunications operators; establishing standards for regulated goods and services; regulating tariffs; managing the radio frequency spectrum; monitoring the performance of the regulated sectors and monitoring the implementation of the Information; and Communications Technology (ICT) operations.

### 2.4.4. Fair Competition Commission of Tanzania (FCC)

The Fair Competition Commission of Tanzania was established in the year 2003 by the Fair Competition Act No 8 of 2003. The aim of FCC is to protect effective competition in trade and commerce and to protect consumers from unfair and misleading market

conduct. The goal is to increase production, distribution and supply efficiency of goods and services in the market. The FCC intervenes where necessary to prevent significant market dominance, price fixing and extortion of monopoly rent to the disadvantage of the consumer and market instability. The FCC also accepts files of complaints by parties (firms or individuals) who claim to have been treated unfairly by another party in the concerned sector. It has power to gather information, conduct investigations and impose sanctions for violations of the law.

## 2.5. Policies

### 2.5.1. The National Telecommunications Policy of Tanzania 1997

The objective of this policy is to ensure that the telecommunications services are provided in a liberalised and competitive manner. This is achieved by ensuring provision of adequate, sustainable and efficient telecommunications services in all sectors of the economy and to put in place a reliable telecommunications infrastructure and ensure service inter-connectivity nationally and internationally. It targets to optimise its contribution to the growth of the economy in Tanzania. It is concerned with things such as the customer premises equipment, local telephone services, national and international long-distance telephone services, mobile radio services, enhanced services, and telecommunications infrastructures. Moreover, it is concerned with tariff guidelines and rural telecommunications development.

### 2.5.2. The Competition Policy of Tanzania

The competition policy of Tanzania addressed the problem of concentration of economic power that can arise from market imperfections, monopolistic behaviour in economic activities and consequent restrictive business practices. Uncompetitive business practices may affect the customer either through unfair prices or unacceptable quality standards or limitations on the availability of goods and services. The competition policy therefore prohibits and outlines laws to prohibit and deal with anticompetitive behaviour in the market. This is important for the telecommunications market as well because consumers may be affected financially and in health by high prices and low quality of instruments such as phones in the telecommunications market.

### 2.5.3. The National Trade Policy

The National Trade policy emphasises the objective of enabling Tanzania to ways and means of navigating through viable and steady path towards competitive export-led growth for the realization of the goal of poverty eradication. Telecommunications is important for trade nationally and internationally as it makes fast contact between trading parties and people can even do e-commerce or buying and selling over the phone. Telecommunications falls under the category of hard infrastructure development in trade policy; the policy emphasises the need to develop it through strategies such as the Information and Communications Technology (ICT) development. The ICT policy

specifically states that foreigners may only be employed as technical experts and not as other employees who do jobs that Tanzanians can well manage. This is a way to improve Tanzanian's participation in the ICT sector including the telecommunications. Other policies include the National Science, Technology and Innovation Policy (under preparation) and the National Information and Communications Technology Policy 2003.

## 2.6. Laws and Acts

The telecommunications industry of Tanzania is governed by different laws and acts such as Tanzania Communications Regulatory Authority act of 2003, Fair Competition Act No 8 of 2003, and Electronic and Postal Communications Act No 3 of 2010; as well as the Universal Communications Service Access Act No 12 of 2006.  All these are put in place to avoid harm done to individual consumers of other firms in the sector as well as in other interacting sectors.  Because the market is liberalised, investors are allowed to invest in the industry as long as they abide by the rules and regulations put by the nation as well as the international rules and regulations.  Engaging in anticompetitive actions is punishable by law. Breaches of the Act in these instances can result in penalties up to 10 million dollars.  The acts include:  The Tanzania Communications (Broadband Service) Regulations 2005; The Tanzania Communications (Consumer Protection) Regulations 2005; The Tanzania Broadcasting Services (Content) Regulations 2005; The Tanzania Communications (Licensing) Regulations 2005; The

Tanzania Communications (Importation and Distribution) Regulations 2005; The Tanzania Communications (Installations and Maintenance) Regulations 2005; The Tanzania Communications (Interconnection) Regulations 2005; The Tanzania Communications (Telecommunication Numbering and Electronic Address) Regulations 2005; The Tanzania Communications (Radio Communications and Frequency Spectrum) Regulations 2005; The Tanzania Communications (Tariff) Regulations 2005; The Tanzania Communications (Type Approval of Electronic Communications Equipment) Regulations 2005; The Tanzania Communications (Quality of Service) Regulations 2005; and The Tanzania Communications (Access and Facilities) Regulations 2005.

## 2.7. Summary of the Chapter

This chapter presented an overview of the telecommunications industry in Tanzania. The government has put measures and bodies in place to oversee the conduct of the firms in the telecommunications industry making sure their actions are not harmful against one another or their customers and third parties.

# CHAPTER THREE

# CONCEPTUAL FRAMEWORK, THEORY AND LITERATURE

This chapter presents some theory on competition and employment, the framework for analysis as well as some important terms for the study. The second part presents empirical literature that was reviewed for the study and the third part describes the gaps and missing links for carrying out of this study.

## 3.1. Theory and Conceptual Framework

Theory for competition in an industry suggests that firms compete in order to maximise their profits and to outdo their rivals in the market. Models are available which analyse the different strategies that competitors may use in the market to achieve their ultimate goals, some of the strategies include increasing output, price reviews and cutting costs. In doing so, there are some effects on the labour market that the firms might otherwise overlook be it positive or negative effects. There is no concrete evidence however that implies competition is only good or only bad for employment in an industry. Some empirical studies have been conducted to analyse the effects of competition on the product or labour market. Competition has been captured by different variables including concentration ratios, market share,

It is expected that a higher competition (more firms in the market) would lead to more employment by the firms and overall as compared to when there is higher market

concentration. A firm will hire workers as long as it thinks that the workers will bring more profit to the firm and the skills they have do match their recruitment needs. Some empirical studies have shown that there is a positive and significant relationship between competition and employment in an industry. Moreover theory also suggests that there are some aspects of competition that will make a firm cut down on workers instead of employing more. More employment will also depend on the marginal productivity of an extra worker.

### 3.1.1. Employment

Classical economists argue that there is a positive relationship between labour and output. According to the general theory of employment by John Maynard Keynes, the level of output and employment as a whole depends of on the amount of investments. Labour is used as an input in the production process and therefore as more units of labour are employed in production the output is expected to increase. But there is a tendency for the marginal output per unit of input to decline after reaching a certain level, therefore, more units of labour would not necessarily increase output. Moreover, in relation to competition, it is expected that as competition increases employers will employ more so that they would increase their output, but on the other hand they might decide to reduce employment so as to decrease costs of operation to maximise profits. The expected effect is therefore ambiguous until the net effect is known.

### 3.1.2. Competition

This occurs when different actors in a market of similar products or services strive to gain a bigger market share so as to increase their profits. By competing, the actors may use different strategies to outdo their rivals through pricing, quantity or advertising and promotions. In economics competition is the act whereby individuals or firms strive to gain a greater share in the market where they buy or sell goods and services. It makes firms to develop new and better products, technologies and services so as to give consumers wider selection causing lower prices in the market. Ccompetition is an ordering force ensuring efficiency of economic processes, since resources are steered to the most productive supplier (McNulty, 1968). Competition can also be termed as a process of rivalry between suppliers which eliminates excessive profits, removes excessive supplies and satisfies existing demand and that it is the same as the process of responding to new situations and a means of achieving new equilibriums in the market (Stigler, 1957). Competition can be measured through indices such as the Herfindahl-Hirschman index, the concentration ratio, and the four-firm concentration ratio. Competitiveness means the ability and performance of a firm to achieve a certain level of productivity in the market relative to others. It is the ability to provide goods or services effectively and efficiently than the relevant competitors (Blunk, 2006). This can be measured by the company's ability to make profits and market shares. Schmuck (2007) researched on competitiveness index in which he found that the index is determined by changing target

markets, adaptation to changes, the rate of marketing budget, the participation in strategic alliances and the workforce fluctuations.

### 3.1.3.  Categories of Competition

There is direct competition and indirect competition.  For indirect competition, the firms offer essentially the same product in the market; they compete by introducing new products or services to the existing ones.  Indirect competition, on the other hand, also means substitute competition where by the products or services offered are close substitutes.   Here the rivals strive for their products to be preferred by majority compared to the other products.

### 3.1.4.  Industry Concept of Competition

In game theory competition is referred to as an attempt to gain monopoly power and profits in the market.  In industrial economics, competition refers to the use of strategies by a company to gain a market shares through price and non-price strategies. Competition usually results in reduction of prices and for identical products price is reduces until it is close to the marginal cost of production.  Price competition involves reducing prices to attract customers while non-price competition includes such things as advertising, research and development, product differentiation (Church and Ware 1999).

### 3.1.5.  Classes of Competition

Classes of competition determine the market structure of the industry in question.  There is perfect competition, monopolistic competition, oligopoly, and monopoly.  Other classes include; duopoly (two firms only), monopsony (one buyer), oligopsony (a few buyers).  Here we will discuss some of these classes relevant to the telecommunications industry in Tanzania.

### 3.1.5.1.          Perfect Competition

This kind of competition is also known as pure competition and it exists when a large number of firms produce identical goods or services.  Most of these businesses are small scale and actors have no control over the market price.  Entry and exit from the market is fairly easy and equilibrium is reached when demand and supply are the same.  This kind of competition does not easily exist in a market because it requires perfect information which is hard to achieve.

### 3.1.5.2.          Monopolistic Competition

This exists when there are a large number of sellers producing differentiated products in the market.  Products are differentiated based on price, quality, branding or packaging.  This usually occurs in retail businesses.

### 3.1.5.3. Oligopoly

An oligopoly is when there are a few firms in the market and large investments are required to enter the market. Products sold in this market can be similar or differentiated and sellers have some control over prices.

### 3.1.5.4. Duopoly

This is when there are only two firms providing the market with a product or service. Between the two firms, one can be a dominant firm (an incumbent) while the rival can be a smaller firm with a smaller share in the market. An incumbent firm might decide to restrict entry of the rival or to sustain it. In 1994-1999 the telecommunications industry of Tanzania was a duopoly with only TTCL and Mobitel in the market.

### 3.1.5.5. Monopoly

A monopoly is a market situation where there is only one producer in the market. This producer determines the market price and the amount of the product to supply to the market. The producer can limit output so as to sell at a higher price to maximise profits. Most monopolies are government created and no competition is allowed in the industry. The telecommunications industry in Tanzania was a monopoly until 1994.

### 3.1.6. Competition in Telecommunications Industry

Telecommunications industry has companies which provide point to point communications services including telephone services, television and radio broadcasting, and paging and beeper services. Competition in this industry is fierce worldwide as internet companies such as Google, Skype and Nimbuzz offer voice and message services alongside the national telecommunications companies making the market for telecommunications very stiff. There is no exception in Tanzania as the telecommunications companies in the country involve in such solid competitions with one another. Competition has increased significantly over the last year in Tanzania. Besides quality, coverage plays an extremely important role in the competition race.

A report on the telecommunications sector in Tanzania argued that competition increases coverage and investment in technology, lowers tariffs, increases consumer choice and leads to better and new products and services. It also showed that 19.4 per cent of the population had cell-phone lines connected in 2007 but there was no indication of the effect of competition on employment. The study was analytical and used secondary data from the databases of Tanzania. Competition can be measured by several indices including the Herfindahl-Hirschman, the concentration ratio, the Lerner index, the price-cost margin and the share of profits in the market. This dissertation concentrates in direct competition in the oligopolistic or monopolistically competitive telecommunications market in Tanzania.

## 3.2. Empirical Literature Review

A few studies exist on competition related aspects of telecommunication in Tanzania. Kahyarara (2011) found a positive a significant correlation between competition and productivity. He set out to analyse the impact of market competition on performance of firms in developing countries. Competition was measured using the HH index and used generalized method of moments (GMM) for his estimations as well as fixed effects method for the panel data. He indicated that competition enhances market productivity and hence profitability. However he did not analyse the effect on employment.

John (2008) did an empirical study in Tanzania with the general objective of finding the extent to which competition in mobile phone industry has affected the service provision. He used cross-sectional survey design to analyse marketing competition in mobile telecommunications industry in Tanzania. He found that free and open competition benefits individual consumers and the global community. His study did not analyse the effect of competition on firm level employment and it used cross sectional survey data. This study however differs by using panel data analysis and taking into account the effect of competition in this industry on employment. Moreover this study uses fixed effects regressions on the data to see if there are any firm specific characteristics that may affect the results of competition on employment.

A study by Katz et al. (2007) in Germany analysed the impact of broadband installation on output and jobs found that the initial effect on employment was negative, that is an increase in competition due to broadband deployment initially decreased employment in Germany but later on it increased employment. The study was analytical and explained as being due to the fact that at first workers who could not use the technology had to be laid off and later training made them competent enough to use the technology and even more people could now be employed in different firms and hence an increase of employment; this in turn increased national output.

Blanchflower and Machin (1995) analysed the effect of product market competition on employment and wages using two cross-sectional surveys in Britain and Australia in 1990 and found that competition has only a limited role on employment and wages although some significant effects are found in some of the skill groups analysed.

A report on telecommunications liberalization program done in 2004 by Eastern Carribean Communications Authority analysed the impact of liberalizing the communications sector in the region because it was first characterised by monopoly control, high service costs, low quality of services, limited access to technology and communications infrastructure, and shortage of trained personnel. After liberalization it was found that the sector direct employment fell but indirect employment increased which led to an overall rise in employment. Moreover the contribution of the sector to GDP was raised compared to other sectors in the economy. This is an indication that

competition in the telecommunications industry increased employment in the country although indirectly while the service also contributed more to the GDP of the nation.

A report by Li and Xu (2002) on the impact of privatisation and competition in the world telecommunications sector used panel data of 177 countries while competition was used as a dummy taking the value of zero where there was only one firm and 1 when there was more than one firm. They used country-specific fixed effects model and found that there was a shift from monopolistic market to a market with some degree of competition; competition had small and statistically insignificant effect on employment but it raised technology significantly.

Basker (2002) in a study titled "Competition, Efficiency, and Employment: Labour-Market Effects of Wal-Mart Expansion" in the USA analysed the employment and efficiency effects of competition. He used data from a census survey and conducted an OLS regression while correcting for errors and found out that increase in establishments (competition) resulted in the net creation of more jobs in the economy. This study used cross-sectional survey data but did not account for individual specific effects and that might affect competition and bias the OLS regression. Although the results were a net positive increase in jobs, fixed effects might have generated otherwise insignificant results. Moreover, Basker found that as competition increased smaller retail firms closed down which affected wholesale firms and their employees were forced to move to neighbouring countries.

A study by Amable and Gatti (2001) found out that increased competition in the product market increases the hiring and firing rates of competitors. They used panel industry data for German and used a monopolistic competition model and assume firms use efficiency wage mechanism. They concluded that the net effect of competition on the labour market depends on the relative elasticities of the firing and hiring rates to an increase in competition. Moreover they found that competition increased employment in the market and that the consequent rise in turnover rate calls for a rise in efficiency wage in the product market.

Bortolotti et al. (2001) did a research on the on the global telecommunications industry using panel data for 25 countries and 31 telecommunications companies. They used fixed effects estimates taking into account the country specific features that may affect the telecommunications industry such as national policies. They found that competition significantly reduces profitability, employment and—surprisingly--efficiency after privatization while creation of an independent regulatory agency significantly increases output; and mandating third party access to an incumbent's network is associated with a significant decrease in the incumbent's investment and an increase in employment. Overall, privatisation which leads to competition significantly reduces employment.

 Konings and Wash (2000) also did a study in the UK analysing the effects of competition on the labour market controlling for unionisation. They used firm level panel data for the period of 1985-1989 and found that in the short run competition

decreased employment growth but this effect was not present in unionised firms; that is in unionised firms, competition seemed to increase employment. They also suggested that the results may have been influenced by imperfections in the labour and product markets.

A study by Davis-Blake and Uzzi (1993) was conducted to analyze what determined the firm's decision either to hire permanent workers or temporary workers. It used data of the US department of Labor's Employment Opportunity Pilot Project Employer surveys to test their hypotheses and found that firms employ external temporary workers to allow for flexibility when they want to expand or decrease firm level employment. It also found a positive relationship between the decision of a firm to use permanent workers and factors such as firm specific employment, government oversight, and bureaucratization of employment practices, firm size, and high level of informational or technical skills requirement.

Another research report of Organisation for Economic Cooperation and Development (1996) revealed that there was an increase of competition in the OECD countries' telecommunications market and that it led to a reduction in the average employment in that industry. The study was done in 1996 and examined competition and employment levels among the OECD countries.

Trauth and Pitt (1992) conducted an analytical study and found that the US and the UK both had monopolies in the telecommunications industry, with the opening up of markets competition increased and suggested that this has to be addressed by policy measures and that there is a need for a new global public policy paradigm – making the telecommunications way of life competitive. They did not, however, analyse the impact of this rise in competition on the labour market. The study was qualitative and did not use any statistical data to prove the rise in competition in the telecommunications markets; they just considered that the rise in the number of firms was an indication of a rise in market competition.

### 3.3. Gaps and Missing Links

Some of the studies used cross sectional data and employed simple OLS regressions; a few used panel data for analysis but did not account for firm specific characters that might affect the models. However, this study uses panel data over a period of seventeen years to explain employment changes as accounted for by competition. Some of the gaps that the researcher has seen form the reviewed literature are: many of the past researchers used cross-sectional data and analysed the data by using OLS or just analytical study. Those who used panel data, the data was for several countries but not for one country with several firms, they therefore controlled for country specific characteristics.

## 3.4. Summary of the Chapter

A competition issue is an individual specific aspect. But this individual (firm in this case) is competing against others in the field in question; we cannot, therefore, use individual data to study competition. This is the justification for the use of panel data, which has rich information, for this study while controlling for the individual specific characteristics that affect firms' decisions to compete. However, there are some limitations to the study in the data used because the data is not well balanced. There are some companies which started earlier than others, for example the gap between Sasatel and Airtel, Vodacom or Tigo is big enough such that we cannot assess competition fully. Another source of limitations for this study is finance and missing data. The data that the researcher intended to use for the study was not fully available and some companies were reluctant to give certain information.

# CHAPTER FOUR

# METHODOLOGY

This chapter presents the data that was obtained, the method of analysis of the data as well as the findings obtained from the analysis. The first sub-heading presents the hypotheses to be tested in the model, the second one presents the measures of competition for the analysis while the third presents the model to be estimated. The fourth one is the estimation techniques followed by the presentation of data and its sources in summary statistics presenting the characteristics of the data and then the chapter is summarised at the end.

## 4.1. Hypotheses

The hypotheses to be tested are the following:

i. **H$_0$:** There exists a net positive relationship between employment and competition in the telecommunications industry in Tanzania. (All $\alpha_i \neq 0$)

**H$_1$:** There is no net positive relationship between employment and competition in the telecommunications industry in Tanzania. (All $\alpha_i = 0$)

ii. **H$_0$:** There are firm specific characteristics that affect the model (All $u_i = 0$)

**H$_1$:** There are no firm specific characteristics that affect the model (All $u_i \neq 0$)

iii. **H₀:** There are gains to employment in the telecommunications industry due to competition

**H₀:** There are no gains to employment in the telecommunications industry due to competition

## 4.2. Measuring Competition

### 4.2.1. The Herfindahl-Hirschman Index (HHI)

This index is a measure of the market concentration and is also known as the Herfindahl index. It is equal to the sum of squared market shares of firms in an industry and it ranges from 1/N to 1. Whereby 0 is when the market is perfectly competitive and 1 is for monopoly in the market. The smaller the index the higher the competition and the larger the index the less is the competition in the market. The formula for calculating the Herfindahl index is:

$$H = \sum_{i=1}^{N} s_i^2$$

Where $i=1...N$; the $i^{th}$ firm, N=the number of firms in the market, and $s_{i=the}$ share of the $i^{th}$ firm in the market

### 4.2.2. The Normalised HHI

This index ranges from 0 to 1 and is calculated as:

$$H^* = \frac{(H - 1/N)}{1 - 1/N}$$

Where $H^*$ is the normalised Herfindahl index, H is the Herfindahl index, and N is the number of firms in the market

### 4.2.3. The m-Concentration Ratio

This is the sum of the market shares of the firms in an industry and it is written as:

$$C_m = \sum_{i=1}^{m} s_i$$

Where m= the number of the largest m-firms in the market, $i$=is the firm, and $S_i$ =the market share of the $i^{th}$ firm. There are three large firms in the industry and therefore the researcher will compare the commonly used CR4 (four firm concentration) and CR3 (three firm concentration).

### 4.2.4. The Lerner Index

This index measures market power and is defined as the weighted average of each firm's margin, the weights are the firms' market shares. It is given by:

$$L = \sum_{i=1}^{n} s_i \frac{p - MC_i}{p}$$

Where L is the Lerner index, $S_i$ is the market share of the $i^{th}$ firm, n is the number of firms in the market, p is the price of the product, MC is the firm's marginal cost, and p-$MC_i$ is the price-cost margin of the $i^{th}$ firm.

The Lerner index is not used in this study because the researcher could not obtain data for marginal costs of all the firms in the industry as well as for prices they charge. Therefore the analysis is based on the Herfindahl-Hirschman index and the concentration ratios to measure competition and its impact on employment in telecommunications market in Tanzania.

## 4.3. Model Specification

The following are the three equations to be estimated. The dependent variable is the number of employees represented by the log of the number of employees; the explanatory variables include the log of the number of subscribers, the market share, the competition index, the size of a firm as well as the time (rounds).

## Equation 1

$$\log emp_{it} = \alpha_1 \log sub_{it} + \alpha_3 mktshr_{it} + + \alpha_6 Round1 + \alpha_7 Round2 + \alpha_8 Round3$$
$$+ \alpha_9 Round4 + \alpha_{10} Round5 + \alpha_{11} Round6 + \alpha_{12} Round7 + \alpha_{13} Round8 + \alpha_{14} Round10 + \varepsilon_{it}$$

The first equation estimates the effects that the number of subscribers and the market share have on the number of employees in the market, the rounds 1 to 9 are included in

the model to estimate the impact of time on employment due to all factors in the model as compared to round10 (the control variable).

**Equation 2**

$$\log emp_{it} = \alpha_1 \log sub_{it} + \alpha_2 HHI_t + \alpha_3 mktshr_{it} + + \alpha_6 Round1 + \alpha_7 Round2 + \alpha_8 Round3$$
$$+ \alpha_9 Round4 + \alpha_{10} Round5 + \alpha_{11} Round6 + \alpha_{12} Round7 + \alpha_{13} Round8 + \alpha_{14} Round10 + \varepsilon_{it}$$

In the second equation, the competition index (HHI) is added in the model so as to address the key question of the effect of competition on employment.

**Equation 3**

$$\log emp_{it} = \alpha_1 \log sub_{it} + \alpha_2 HHI_t + \alpha_3 mktshr_{it} + \alpha_4 Medium_{it} + \alpha_5 Small_{it} + \alpha_6 Round1$$
$$+ \alpha_7 Round2 + \alpha_8 Round3 + \alpha_9 Round4 + \alpha_{10} Round5$$
$$+ \alpha_{11} Round6 + \alpha_{12} Round7 + \alpha_{13} Round8 + \alpha_{14} Round10 + \varepsilon_{it}$$

In the third equation, the size of the firm is added to compare the effect of small and medium firm to that of a large firm.

**Equation 4**

$$\varepsilon_{it} = \mu_i + \omega_t$$

The above equation shows that there are fixed and random effects that if not accounted for will be captured in the error term and bias the simple OLS results.

## 4.4. Estimation Techniques

The above model is estimated using simple OLS regression as well as fixed effects regression. Fixed effects model accounts for any firm specific characteristics which if present tend to bias the OLS results.

## 4.5. Types and Sources of Data

The type of data used in this study is panel data collected on the seven telecommunications companies in Tanzania over the period of 1994 to 2010. Panel data is used because it is a rich data and it captures both the time and individual characteristics when used. The source of this data is the Tanzania Telecommunications Regulations Authority and the companies themselves. Data is also collected from questionnaires filled by some of the employees of these companies situated in Dar-es-Salaam region representing the views of the employees of these companies.

## 4.6. Summary Statistics

**Table 1: Summary Statistics in Years for the Variables**

| Variable | Overall | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---|---|---|---|---|---|---|---|---|
| Employees | 1,049 | 2,465 | 2,505 | 2,332 | 2,518 | 2,474 | 1,465 | 933.6 | 817.33 |
| | (1,351) | (3,119) | (3,125) | (3,086) | (3,059) | (2,990) | (2,189) | (1549) | (1,370) |
| Subscribers | 955,229 | 91,523 | 94,040 | 96,974 | 100,416 | 104,480 | 109,302 | 56,829 | 81,795 |
| | (1,762,864) | (105,325) | (103,555) | (101,195) | (98,116) | (94,158) | (89,128) | (70,170) | (81,532) |
| Total | 4,455,116 | 183047 | 188,081 | 193,948 | 200,832 | 208,960 | 218,604 | 284,147 | 490,775 |
| Subscribers | (6,536,491) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Market Share | 0.22 | 0.50 | 0.50 | 0.39 | 0.50 | 0.50 | 0.50 | 0.20 | 0.17 |
| | (0.24) | (0.56) | (0.55) | (0.52 | (0.50) | (0.45) | (0.41) | (0.25) | (0.17) |
| HHI | 0.48 | 0.83 | 0.80 | 0.78 | 0.73 | 0.70 | 0.66 | 0.44 | 0.30 |
| | (0.21) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Log | 6.13 | 7.00 | 7.07 | 7.16 | 7.16 | 7.16 | 6.03 | 5.68 | 5.66 |
| Employees | (1.37) | (2.04) | (1.96) | (1.84) | (1.82) | (1.80) | (2.19) | (1.74) | (1.57) |
| Log | 11.64 | 10.88 | 10.99 | 11.09 | 11.19 | 11.30 | 11.40 | 9.15 | 9.86 |

| Subscribers | (2.87) | (1.61) | (1.47) | (1.34) | (1.20) | (1.07) | (0.93) | (3.38) | (3.01) |
|---|---|---|---|---|---|---|---|---|---|
| Large | 0.55 | 0.86 | 0.86 | 0.86 | 0.86 | 0.86 | 0.71 | 0.43 | 0.29 |
| | (0.50) | (0.38) | (0.38) | (0.38) | (0.38) | (0.38) | (0.49) | (0.53) | (0.49) |
| Medium | 0.29 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 | 0.29 | 0.43 |
| | (0.46) | (0.38) | (0.38) | (0.38) | (0.38) | (0.38) | (0.38) | (0.49) | (0.53) |
| Small | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.14 | 0.29 | 0.29 |
| | (0.37) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.38) | (0.49) | (0.49) |

*Source: Computed from acquired data set     Figures in parentheses are the standard deviations*

*Summary statistics from Table 1 continued….*

| Variable | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|---|
| Employees | 868.17 | 930 | 923 | 757 | 790 | 764 | 805 | 719 | 720 |
| | (1331.83) | (1357) | (1,295) | (832) | (805) | (670) | (670) | (654) | (656) |
| Subscribers | 128,097 | 240,887 | 356,807 | 526,107 | 962,649 | 1,419,677 | 2,204,178 | 2,525,175 | 2,969,728 |
| | (108,069) | (250,840) | (405,262) | (614,817) | (1,133,158) | (1,505,219) | (2,155,872) | (2,788,673) | (3,335,150) |
| Total | 768,585 | 1,400,000 | 2,100,000 | 3,200,000 | 5,800,000 | 8,500,000 | 13,000,000 | 18,000,000 | 21,000,000 |
| Subscribers | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Market Share | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.14 | 0.14 |
| | (0.14) | (0.17) | (0.19) | (0.20) | (0.20) | (0.18) | (0.16) | (0.16) | (0.16) |
| HHI | 0.25 | 0.31 | 0.34 | 0.36 | 0.36 | 0.33 | 0.31 | 0.30 | 0.30 |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Log | 5.81 | 55.86 | 5.97 | 6.03 | 6.13 | 6.19 | 6.26 | 6.08 | 6.06 |
| Employees | (1.57) | (1.56) | (1.49) | (1.27) | (1.25) | (1.18) | (1.17) | (1.02) | (1.23) |
| Log | 10.57 | 11.16 | 11.52 | 11.86 | 12.48 | 12.97 | 13.28 | 12.27 | 13.11 |
| Subscribers | (2.88) | (2.86) | (2.76) | (2.68) | (2.67) | (2.58) | (2.82) | (4.25) | (3.07) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Large | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.29 | 0.29 |
| | (0.53) | (0.53) | (0.53) | (0.53) | (0.53) | (0.53) | (0.53) | (0.49) | (0.49) |
| Medium | 0.29 | 0.29 | 0.29 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 | 0.43 |
| | (0.59) | (0.59) | (0.59) | (0.53) | (0.53) | (0.53) | (0.53) | (0.53) | (0.53) |
| Small | 0.29 | 0.29 | 0.29 | 0.14 | 0.14 | 0.14 | 0.14 | 0.29 | 0.29 |
| | (0.59) | (0.59) | (0.59) | (0.38) | (0.38) | (0.38) | (0.38) | (0.49) | (0.49) |

*Source: Computed from acquired data set    Figures    in    parentheses    are    the    standard    deviations*

*The number of Employees* – the variable is measured by the number of workers employed in a firm as per the data provided by the respective companies. The overall average of the number of employees is 1,049 with a standard deviation of 1,351 indicating that there are outliers and that while some companies have a lot of employees (more than 2000); others have less than 100 employees in the market

*The number of Subscribers* – this variable is measured by the number of customers subscribed in a company, the data was obtained from the TCRA website. And the *total number of subscribers* is the sum of all subscribers to the different companies in the market  The overall average of the number of customers is 955,229 with a large standard deviation of 1, 7762,864. This is an indication that some firms have a very large number of customers while others still have a few customers

*The Market Share* – this variable is a measure of the percentage of customers a firm has compared to the total number of subscribers in the market. Observations for market shares show a more or less the same trend over the years (around 0.17) with a large deviation (0.14 – 0.20) from the mean (0.17).

*The HHI* – this is the Herfindahl Hirschman Index which is a measure of competition in the market as explained earlier. It is calculated from the firms' market share to determine the market competition. The Herfindahl Hirschman Index as a measure of competition averages at 0.48 which is almost a median value indicating that the market

is not totally competitive (0.00) but it is also not totally dominated by a few (almost 1.00); the value of the standard error (0.21) is large signifying that there is a large deviation from the mean.

*The Firm Size* – The size of the firm is categorised as Large, Medium or Small according to the number of employees in the company (more than 800 for large, between 150 and 800 for medium and less that 150 as small). This variable is used in the model to analyse the effect of the size of the firm on the explanatory variables. When used in the model, variables medium and small control for large firm.

*The Time Variable* – this variable is measured in rounds 1 to 10 representing years 2001 to 2010. It is included in the model to measure the effect of time on the explanatory variables in explaining employment. In the model round 10 is a control variable; so rounds 1 to 9 are included

**4.7. Summary of the Chapter**

This chapter presented the data and model used in the analysis. It explained the type of data and sources the data was obtained from. It also showed the equations in the model that test the correlation between employment and competition in the market. Measures of competition were also presented in this chapter and the summary statistics showing the variables that are used in the estimated model. The following chapter shows the descriptive and empirical results as well as the interpretation of these results.

# CHAPTER FIVE

# DESCRIPTIVE RESULTS, EMPIRICAL FINDINGS AND INTERPRETATION OF RESULTS

The first part of this chapter presents the descriptive results showing the picture the data set portrays in the telecommunications market in Tanzania; the second part show the empirical results of the model, that is the statistical findings from the data and lastly the results are interpreted in the last part.

## 5.1. Descriptive Results

### 5.1.1. Company Ownership Type

Out of the seven firms in the telecommunications market in Tanzania, six are private-foreign companies while only one, TTCL, is public-domestic. This is an indication that telecommunications in Tanzania is dominated by foreign investors and no Tanzanian so far has invested in telecommunications sector in Tanzania. This may be because of the market liberalization and the technology involved requiring a large capital which most Tanzanians cannot afford. Evidence for this being one of the most expensive markets to invest in is the Vodacom South Africa which required over US $300 million (approximately 455.522 billion Tanzanian shillings) just for network expansion while Vodacom Tanzania acquired its license in 1999 at US$50 million (759.254 million

Tanzania shillings). TTCL stood out to be the only public-private company, it was first a purely government owned company before part-privatisation in 2001 whereby 35 per cent of the shares were acquired by MSI of the Netherlands and Detecon of German. It is shown in the figure below that 85.71 per cent on the telecommunications companies are private foreign while 14.29 per cent is private public.

**Figure 1: Type of Company Ownership by Percentage**
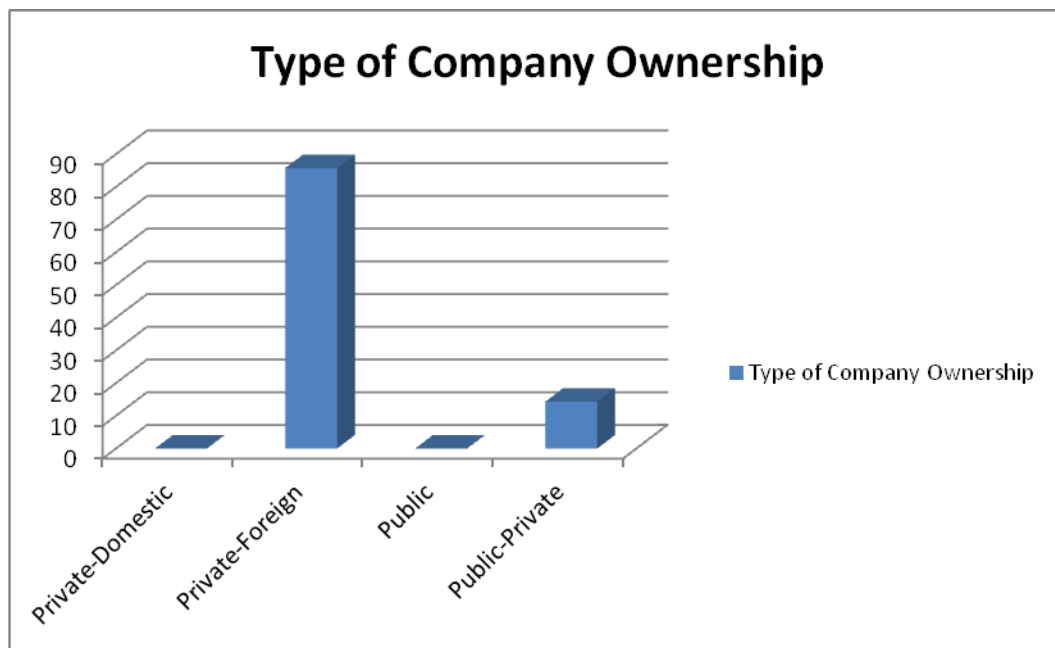


*Source: Questionnaire Responses and Company Websites*

## 5.1.2. Types of Products and Services in the Market

Some of the products and services offered by the telecommunications companies in the market are handsets, modems, data bundles for internet connections sold in megabytes

and charged per kilobyte used, voice calls per second or per minute offering post-paid and pre-paid services. They also offer SMS (Short Messaging Service) and MMS (Multimedia Messaging Service) for sending videos, photos and audio for compatible cellular phones. The MMS service is offered by four companies Vodacom, Airtel, Tigo, and Zantel which provide GSM (Global System for Mobile communication) network services while Benson, Sasatel, and TTCL do not offer MMS because they operate on CDMA (Code-Division Multiple Access) which is not as advanced network as GSM. Only one company (Zantel) offers laptops on promotional basis charging TZS 99,000 per month for thirteen months.

**Figure 2: Products and Services in the Telecommunications Market**
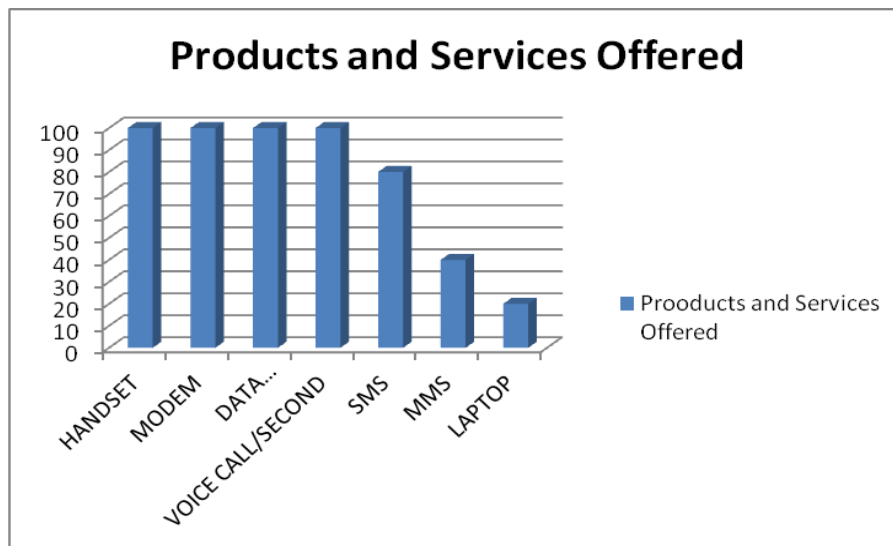


*Source: Questionnaire Responses and Company Websites*

All companies charge lower for the calls made to the same network and others like Tigo go to the extent of having free calls during the night just to promote their services and attract users. Voice call charges to other networks are slightly higher than those to the same network. The data obtained shows that Zantel offers the lowest tariff for off net, east Africa and international calls followed by Sasatel which is a new player in the market. A company that seems to be charging higher than the rest is Vodacom whose tariffs are relatively higher than any other company.

Some of these networks also offer money transfer and money saving services for their customers such as M-PESA for Vodacom, ZAP for Airtel, Z-PESA for Zantel and Tigo PESA for Tigo. With this kind of service, customers can save their money as they do in banks and they are charged for withdrawing or transfer to other customers. This service is also used by companies such as TANESCO, DAWASCO, DSTV and many other firms for bill settlements.

Moreover, these companies offer caller tunes services whereby when a person calls the tone is a song of choice of the customer being called. Customers can also send or receive call time credit from others in the same network, send or receive messages to ask for a person to call or to recharge. There are also other services for a discount in calls or SMS.

**Table 2**: **Tariff by Operator**

| Average Tariff in 2010 | VODACOM | AIRTEL | TIGO | ZANTEL | TTCL | BENSON | SASATEL |
|---|---|---|---|---|---|---|---|
| On Net Calls | 240 | 60 | 68 | 60 | 120 | 50 | 30 |
| Off Net Calls | 390 | 360 | 360 | 330 | 230 | 150 | 231 |
| East Africa Calls | 350 | 343 | 310 | 330 | 330 | 250 | 342 |
| International Calls | 500 | 430 | 507 | 475 | 507 | 290 | 541 |
| SMS National (2009) | 45 | 47 | 49 | 40 | n/a | 20 | n/a |
| SMS International (2009) | 100 | 106 | 98 | 75 | n/a | n/a | n/a |

*Source: TCRA website*

In terms of competition this indicates that as more firms are established in the market, tariffs are lowered to make it more affordable for new subscribers to join their networks.

### 5.1.3. Competition Techniques

In the telecommunications market, actors use different strategies to win subscribers to join their networks. Some of the strategies mentioned by the respondents of the questionnaires from the companies which responded are listed as innovation of products and introducing new services, improvement of technology, tariff review by cutting call costs per second and messaging costs, market insights by attracting their subscribers to use their services through conducting different surveys and researches to understand the needs and views of their customers so as to improve their services. Other techniques

used are employing skilled personnel, advertisement and promotions as well as diversification of products and services.

The techniques mostly employed are product innovations, technology improvement, followed by marketing insights. Employing skilled personnel is only used by 25% which indicates that as these companies compete to gain market shares, they affect employment only to a small percent compared to how it would be expected to affect employment.

**Figure 3: Expansion of Services in the Market**
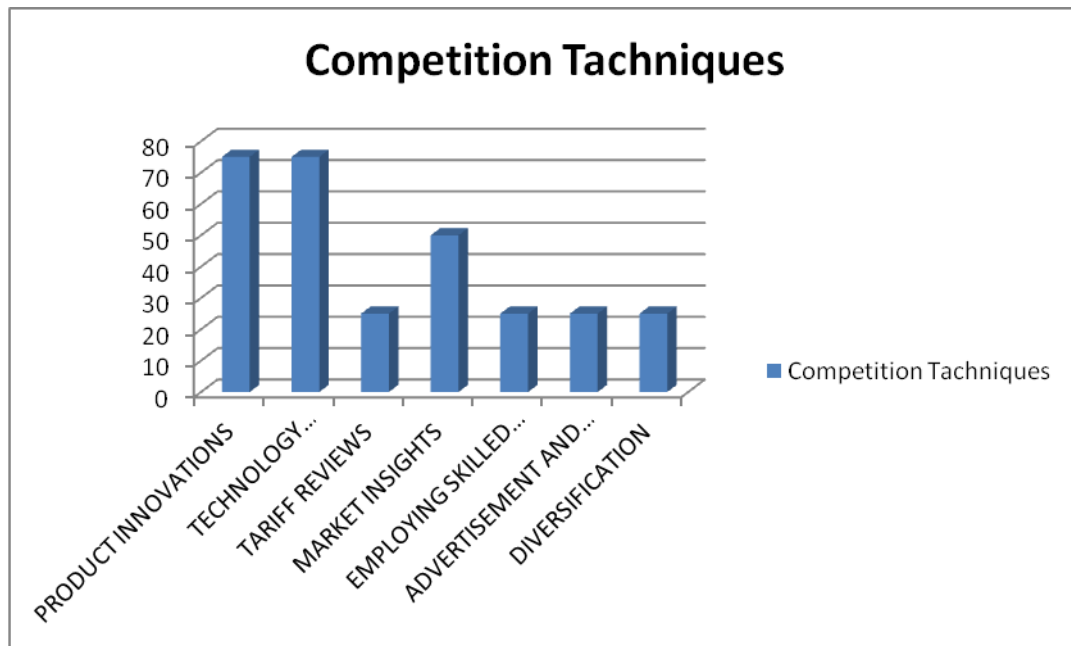


*Source: Questionnaire Responses*

### 5.1.4. Service Expansion by the Companies

In order to win the market the telecommunications companies plan to expand their services by employing various techniques so as to attract customers. Some of the techniques they plan to use is the introduction of fibre technology which is a technology for transmitting telephone signals, internet communication and cable television signals, this option was specified by Vodacom Tanzania limited. Another method is advancing of products and services as specified by Zantel Tanzania which includes introducing new and better products.

**Figure 4: Expansion of Services in the Market**
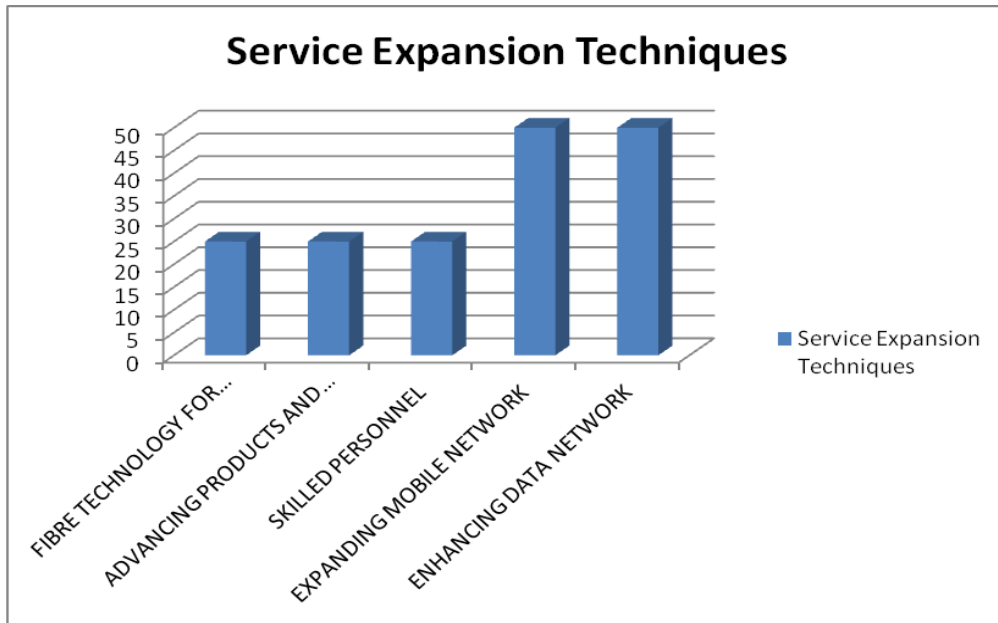


*Source: Questionnaire Responses*

### 5.1.5. Competitors in the Market

In the telecommunications market in Tanzania, some players are considered to be key rivals to the other players. According to the questionnaires responded by TTCL, Zantel, and Benson, Vodacom, Airtel and Tigo are the three companies considered top players and top rivals in the market and they have the largest number of subscribers. By January 2010, these three companies alone held about 90% of the market share with more than sixteen million subscribers out of the seventeen million subscribers.

**Figure 5: Competitors in the Market**
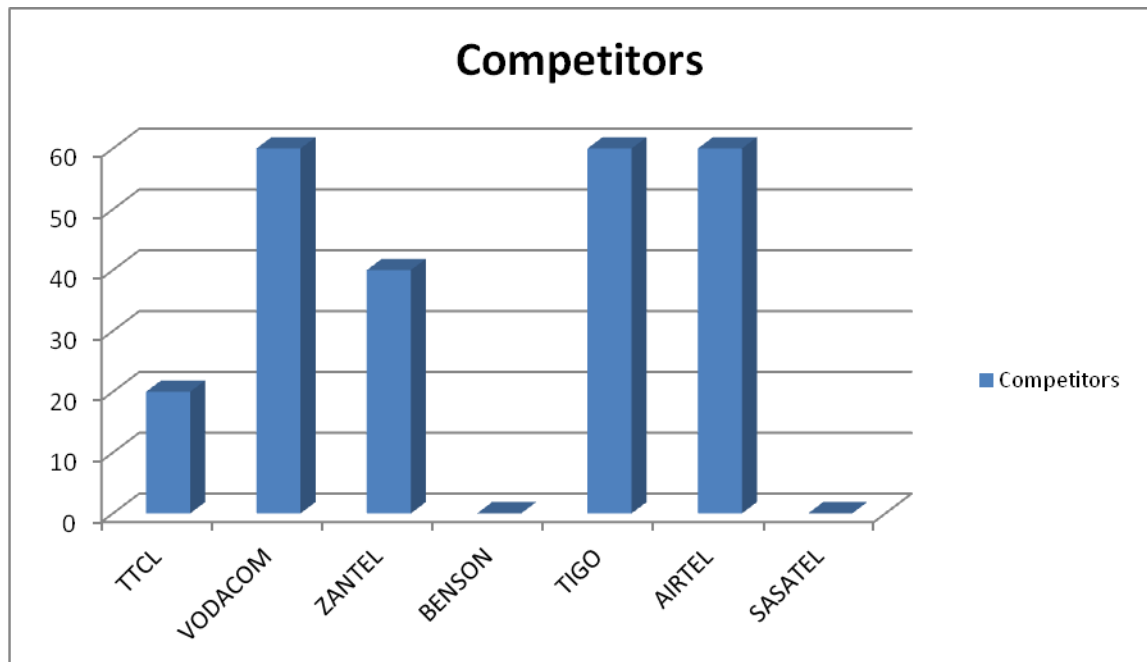


*Source: Questionnaire Responses*

### 5.1.6.  Firm Level Employment

TTCL being the oldest player in the market has employment data from before 1994. The statistics show that TTCL had more than four thousand employees all over Tanzania but this has been declining since 1997.  TTCL was a monopoly in the telecommunications market until 1994 when Mobitel was licensed; this could explain the declining level of TTCL employment due to downsizing because they lost their monopoly power in the market. As more players entered the market, TTCL has continued to reduce employees while the new companies show a rising trend in employment since they started operating.

The reduced number of employees in TTCL could also be explained by factors other than losing monopoly such as employees resigning because they have found opportunity to work in a different company of the same nature as well as technology now that fewer people can operate machines and computers in a firm.  Employment in Vodacom is considerably higher than in other companies.  This can be explained by the fact that it has more market share than any other company in the market, it therefore has to employ more people to serve the large and rising number of customers it has.  Zantel and Airtel have relatively equal numbers of employees, but it is shown that Zantel started with fewer employees than Airtel, this could be due to the fact that, when Zantel started operating in Tanzania mainland, it used Vodacom network services, and it therefore initially did not need to employ many network engineers and other staff compared to

Airtel. Moreover, Benson, although it started operating since 2000, it has kept a very low number of employees compared to the trend shown by other companies. This is because Benson is operating in only two regions, Arusha and Dar-es-Salaam and has a very low market share compared to others. For Sasatel, which started operating in 2009, it has a low number of employees, almost the same as those of Benson. This company started with 120 employees who were also the first customers, the number of employees was lowered because others were only on a temporary contact. Most of these temporary employees were expatriates who were about 80 per cent of the initial employees. Now Sasatel has more than 90 per cent of employees as Tanzanians and few foreigners. The reduction in the number of expatriates could be due to the costs involved in paying the expatriates compared to locals.

Zantel Indicated that about 80 per cent of their employees are Tanzanians the rest being non-Tanzanians while Vodacom indicated more than 98 per cent of the employees are Tanzanians. On the other hand, TTCL responded that their employees are 100 per cent Tanzanians; they have no non-Tanzanian employees in the company.

The question of whether or not there are gains to employment due to competition in the telecommunications industry was addressed by the questionnaires that were distributed. The respondents indicated that an increase in competition is favourable to them in that the working conditions are better and salaries have improved; only 20 per cent of the employees were willing to leave their jobs for a better pay in another company and most

were paid more that 800,000 per month.  These observations, however, might be biased

by the fact that those who filled the questionnaires are those who maintained their posts

after competition and they are the ones who were willing and available at the time.

**Table 3**: **Firm Level Employment**

| Year | TTCL | Vodacom | Zantel | Benson | Sasatel | Tigo | Airtel | Total |
|------|------|---------|--------|--------|---------|------|--------|-------|
| 1994 | 4671 | - | - | - | - | 260 | - | 4931 |
| 1995 | 4715 | - | - | - | - | 296 | - | 5011 |
| 1996 | 4715 | - | - | - | - | 350 | - | 5065 |
| 1997 | 4682 | - | - | - | - | 355 | - | 5037 |
| 1998 | 4589 | - | - | - | - | 360 | - | 4949 |
| 1999 | 3987 | - | 50 | - | - | 360 | - | 4397 |
| 2000 | 3683 | 523 | 55 | 60 | - | 347 | - | 4668 |
| 2001 | 3576 | 674 | 56 | 60 | - | 320 | 218 | 4904 |
| 2002 | 3517 | 877 | 60 | 62 | - | 296 | 397 | 5209 |
| 2003 | 3587 | 987 | 70 | 62 | - | 287 | 429 | 5422 |
| 2004 | 3432 | 1186 | 100 | 66 | - | 278 | 476 | 5538 |
| 2005 | 2188 | 1329 | 200 | 68 | - | 278 | 480 | 4543 |
| 2006 | 2085 | 1476 | 300 | 68 | - | 264 | 551 | 4744 |
| 2007 | 1699 | 1487 | 500 | 72 | - | 250 | 576 | 4584 |
| 2008 | 1695 | 1562 | 600 | 75 | - | 280 | 623 | 4835 |
| 2009 | 1665 | 1560 | 680 | 76 | 120 | 286 | 650 | 5037 |
| 2010 | 1664 | 1567 | 689 | 80 | 96 | 300 | 650 | 5046 |
| 2011 | 1663 | 1568 | 696 | 80 | 85 | 300 | 650 | 5042 |

*Source: Questionnaire Responses*

The expansion of employment could be attributed to the fact that the new networks are

expanding their service networks hence setting up new offices in different regions.  This

can explain the high rise in employment for Zantel in the years 2004 to 2009.  This

shows that the establishment of these companies has a positive effect on employment.

Nevertheless, the net effect on employment cannot be justified by looking at this trend because TTCL has been significantly downsizing. It could also indicate that the downsizing of employment in TTCL can lead to a negative net effect of competition in the industry on employment. When TTCL held a monopoly power in the market it was increasing the number of employees in the market until liberalisation which led to new players in the market that TTCL started cutting down on their employees.

**Figure 6: Firm Level Employment**
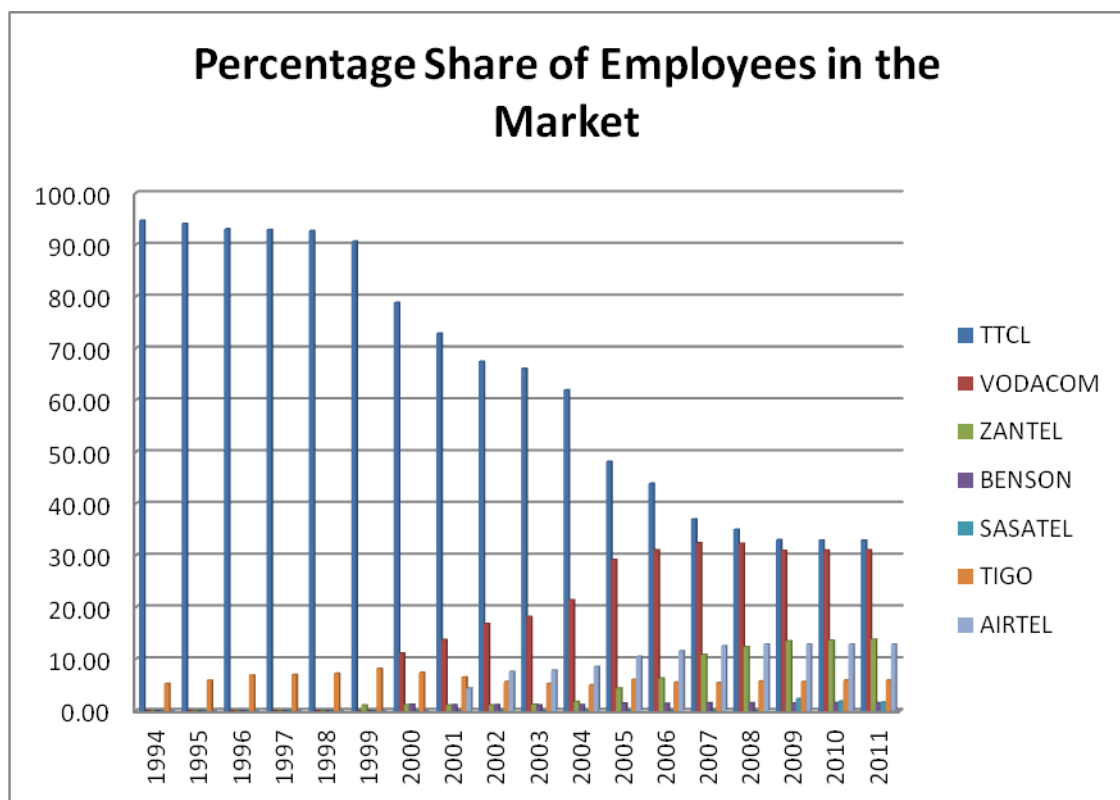


*Source: Questionnaire Responses*

The figure above shows the trends of firm level employment, a declining trend for TTCL and Sasatel and a rising trend for Vodacom, Airtel, Benson, and Zantel, TTCL contributed more than 90 per cent of total employment in the country in 1990s. The share has continued to fall over the years but it still employs the majority of the employees in the telecommunications market in Tanzania. Moreover, these telecommunications companies tend to employ casual and temporary workers especially in periods of promotions and severe advertisements. In other firms, such as Airtel, they outsource customer care attendants. These employees are not considered as part of the Airtel employees' payroll because the owner of the customer services firm is the one being paid by Airtel and then pays the customer care operators. This fact leads to unbalanced observations because Vodacom may seem to contribute more to employment than Airtel because it includes these customer service attendants in their payrolls. Another category of employees that some firms may include in their payrolls while others may not include them is sales representatives/personnel. The sales representatives go out to market the products and services of the company and they get paid according to the number of customers they managed to convince to join the network. Some of these personnel are paid on daily basis or monthly basis; those paid on monthly basis especially the heads of the sales groups are considered as employees of the firm while others are not.

The trend of total employment in the market has not been constantly increasing ranging form 4397 employees to 5538 employees. The peak was in 2004 and the lowest was in 1999.

**Figure 7: Percentage Change in Total Employment**
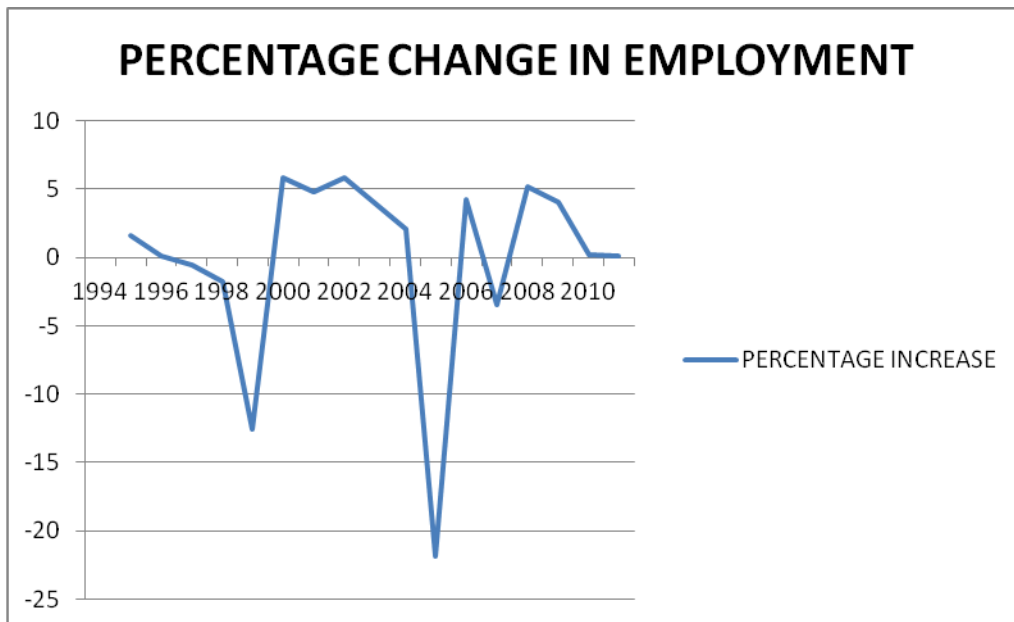


*Source: Computation from questionnaires*

### 5.1.7. Market Shares

When Tigo started operating, it held more 9 per cent of the market share while the majority was held by TTCL at about 90 per cent. When more players came in the market, TTCL lost more and more market share and now it has less than two per cent of the total market share. Tigo continued to gain more market shares until 2000 when

Vodacom and Zantel entered the market. Since then, Vodacom has been the market leader having the majority of the subscribers and TTCL continuing to lose its hold in the market while Airtel holds the second place, Tigo the third place, Zantel the fourth place, Sasatel and Benson the last places having less than one per cent of the total market share.

**Table 4**: **Market Shares**

| Year | TTCL | VODACOM | ZANTEL | BENSON | SASATEL | TIGO | AIRTEL |
|------|------|---------|--------|--------|---------|------|--------|
| 1994 | 90.69 | 0.00 | 0.00 | 0.00 | 0.00 | 9.31 | 0.00 |
| 1995 | 88.93 | 0.00 | 0.00 | 0.00 | 0.00 | 11.07 | 0.00 |
| 1996 | 86.89 | 0.00 | 0.00 | 0.00 | 0.00 | 13.11 | 0.00 |
| 1997 | 84.55 | 0.00 | 0.00 | 0.00 | 0.00 | 15.45 | 0.00 |
| 1998 | 81.86 | 0.00 | 0.00 | 0.00 | 0.00 | 18.14 | 0.00 |
| 1999 | 78.83 | 0.00 | 0.00 | 0.00 | 0.00 | 21.17 | 0.00 |
| 2000 | 61.09 | 17.60 | 1.41 | 0.01 | 0.00 | 19.89 | 0.00 |
| 2001 | 36.23 | 36.68 | 1.32 | 0.01 | 0.00 | 18.15 | 7.61 |
| 2002 | 21.02 | 39.03 | 3.48 | 0.02 | 0.00 | 20.82 | 15.62 |
| 2003 | 10.17 | 48.43 | 4.71 | 0.02 | 0.00 | 14.53 | 22.14 |
| 2004 | 6.93 | 51.38 | 3.97 | 0.02 | 0.00 | 14.15 | 23.54 |
| 2005 | 4.89 | 50.69 | 3.04 | 0.03 | 0.00 | 13.38 | 27.96 |
| 2006 | 2.72 | 51.94 | 6.16 | 0.03 | 0.00 | 13.17 | 25.97 |
| 2007 | 2.71 | 45.79 | 8.03 | 0.04 | 0.00 | 14.09 | 29.35 |
| 2008 | 1.68 | 40.83 | 8.32 | 0.02 | 0.00 | 19.66 | 29.49 |
| 2009 | 1.54 | 39.04 | 7.92 | 0.02 | 0.00 | 23.76 | 27.72 |
| 2010 | 1.23 | 40.41 | 7.70 | 0.01 | 0.14 | 22.13 | 28.38 |

*Source: TCRA Website*

The figures below show the trends in market shares by firms over the years. The trend of TTCL is falling while that of Tigo is unstable although relatively remaining between 12 to 25 per cent. That of Airtel and Zantel has been constantly increasing while for Benson the trend is decreasing due to the fact that the increase in the number of their subscribers is small compares to the overall increase in the total number of subscribers in the whole market. Vodacom's market share has remained in the high end; however there has been a rise and fall in some years. The pie diagrams show how the share of TTCL has declined from 2000 to 2010. Moreover, the Act states that a dominant licensee is one who holds at least 35 per cent of the total market share, for this case Vodacom is the dominant licensee because it has been holding more than that since 2001.

**Figure 8: Market Shares**
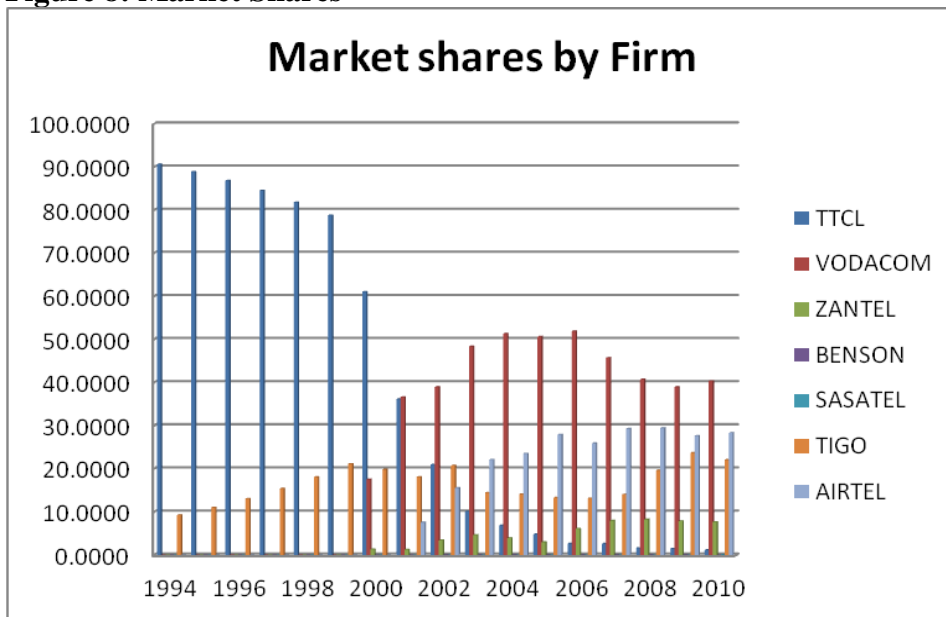


*Source: TCRA website*

In year 2000, TTCL held more than 60 per cent of the market shares but in 2010 it had less than 2 per cent of the total market share.  The explanation for this could be the fact that TTCL is still dependent on fixed line connections which is more than half of their subscribers rather than mobile subscribers.   Due to the fact that the fixed lines connections are not spread throughout especially in the rural area, it awards TTCL one of the bottom three places in the telecommunications market.

**Figure 9: Market Shares in 2000**
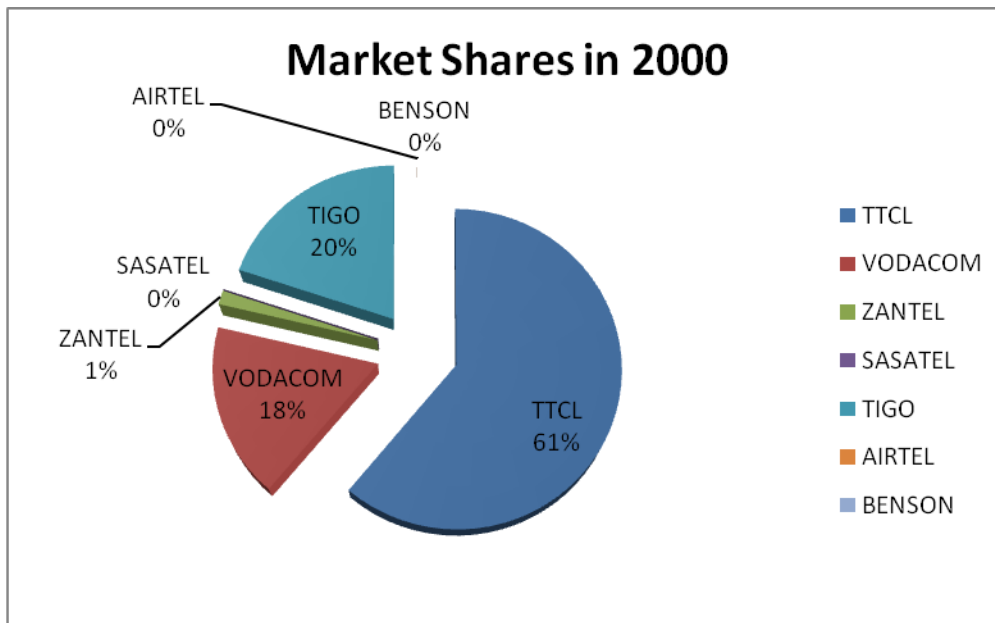


*Source: TCRA website*

**Figure 10: Market Shares in 2010**
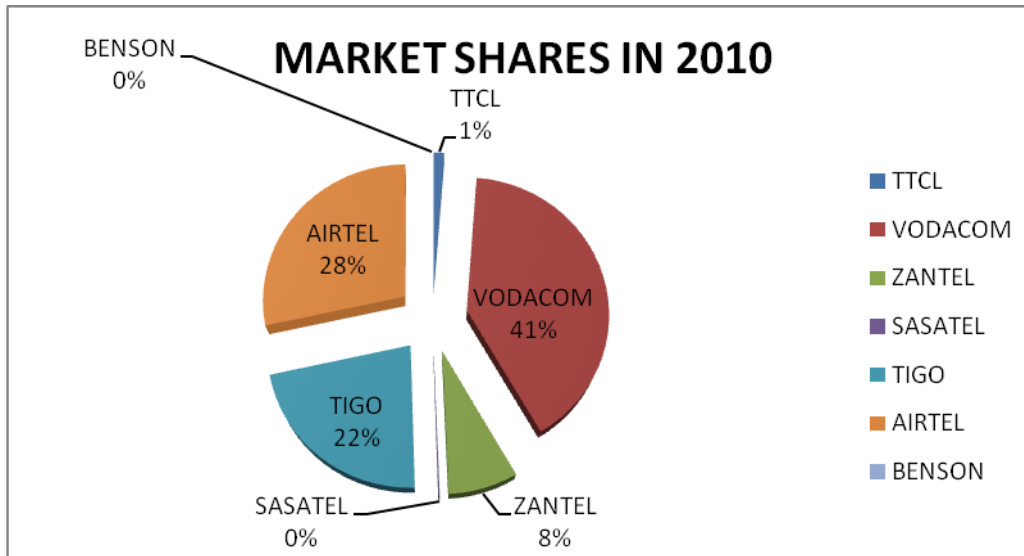


*Source: TCRA website*

The following table shows how market shares of fixed line providers has decreased over the years as the number of mobile subscribers has been increasing in significantly high numbers. In year 2000 and the years preceding it, the share of mobile subscriptions was less than half of the total market share. After 2001 the average share of the fixed line subscriptions has gone to less than one per cent of the total market share. This is an indication that telecommunications in Tanzania is more common with mobile lines rather than fixed lines. Moreover, Tanzanians find it easier to use mobile phones than the difficulties involved in using fixed line connection.

With the rising number of telecommunications service providers in the market, the charges for use of these services have declined substantially making it easier for many

Tanzanians to use the service. There are also a high number of cheap cellular phones in the market which makes it easier for more Tanzanians to manage to own handsets than it is to pay monthly for a fixed line connection.

**Table 5: Fixed Lines and Mobile Shares**

| Year | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|---|---|---|---|
| Fixed Lines | 173,591 | 177,802 | 161,590 | 147,006 | 148,360 | 154,420 | 151,644 | 163,269 | 123,809 |
| Mobile | 110,518 | 275,557 | 606,859 | 1,298,000 | 1,942,000 | 2,963,737 | 5,614,922 | 8,322,857 | 13,006,793 |
| Total | 284,109 | 453,359 | 768,449 | 1,445,006 | 2,090,360 | 3,118,157 | 5,766,566 | 8,486,126 | 13,130,602 |
| Mobile Share | 42% | 61% | 79% | 90% | 93% | 96% | 97% | 98% | 99% |

*Source:* TCRA website

**Figure 11: Market Share by Category**
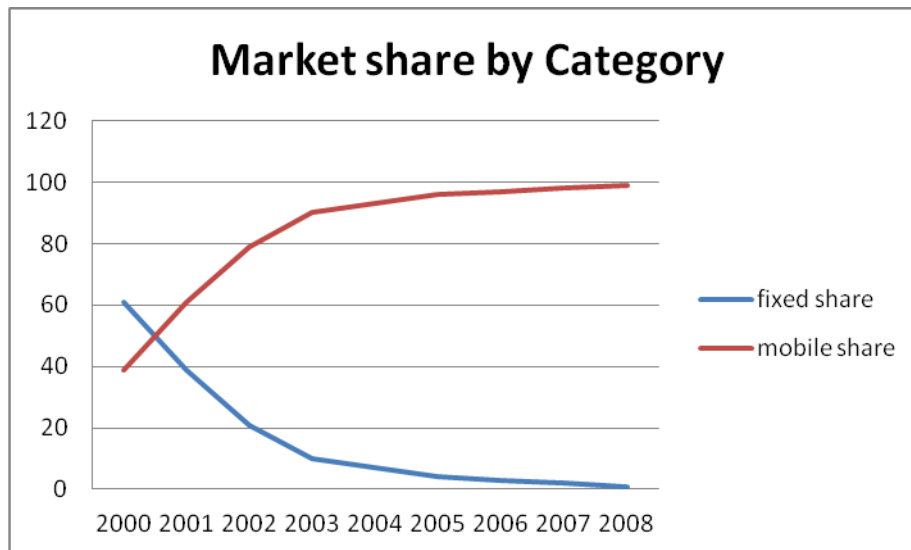


*Source: TCRA website*

## 5.1.8. Competition in the Market

The concentration ratios show how the chosen companies dominate the market. CR4 is the concentration ratio of the four major companies in the market that is Vodacom, Airtel, Tigo and Zantel which held more than 90 per cent of the market in 2010. In 2001 these four companies held more than 60 percent of the market share and the trend is rising. CR3 is the concentration ratio of the three major companies Vodacom, Airtel and Tigo. These three companies held more than 80 per cent of the total market share in 2010 and more than 60 per cent in 2001.

**Table 6: HHI, Normalised HHI, CR4 and CR3**

| Year | HHI | Normalised HHI | CR4 | CR3 |
|------|------|------|------|------|
| 1994 | 0.83 | 0.66 | | |
| 1995 | 0.80 | 0.60 | | |
| 1996 | 0.78 | 0.56 | | |
| 1997 | 0.73 | 0.46 | | |
| 1998 | 0.70 | 0.40 | | |
| 1999 | 0.66 | 0.32 | | |
| 2000 | 0.44 | 0.30 | 0.39 | |
| 2001 | 0.30 | 0.16 | 0.64 | 0.63 |
| 2002 | 0.25 | 0.10 | 0.79 | 0.76 |
| 2003 | 0.31 | 0.17 | 0.90 | 0.85 |
| 2004 | 0.34 | 0.20 | 0.93 | 0.89 |
| 2005 | 0.36 | 0.23 | 0.95 | 0.92 |
| 2006 | 0.36 | 0.23 | 0.97 | 0.91 |
| 2007 | 0.33 | 0.19 | 0.97 | 0.89 |
| 2008 | 0.31 | 0.17 | 0.98 | 0.90 |
| 2009 | 0.30 | 0.18 | 0.99 | 0.91 |
| 2010 | 0.30 | 0.18 | 0.98 | 0.90 |

*Source: Computation from TCRA website data*

A value of HHI is below 1000 (10 per cent or 0.1) this means the market is competitive, the market is moderately concentrated if HHI is between 1,000 and 1,800 (10% < HHI < 18%) and it is considered concentrated if HHI is greater than 1,800 (more than 18 per cent). For the case of Telecommunications market of Tanzania it is still concentrated (according to the U.S. standards), even though there is a decline in the value of HHI. However, according to this standard the normalised HHI shows that the market is moderately concentrated. On the other hand, using another standard it shows that the market structure is oligopolistic for HHI and perfect competitive or monopolistically competitive market for normalised HHI.

**Table 7: Market Structure**

| Market Structure | HHI |
|---|---|
| Perfect Competition | <0.2 |
| Monopolistic Competition | <0.2 |
| Oligopoly | 0.2 < HHI <0.6 |
| Monopoly | >0.6 |

The Herfindahl-Hirshman Index (HHI) shows a declining trend over the years. In 1994, when there were only two companies in the market, the HHI was 0.83. This figure indicates that the situation in the market was close to a monopoly. Because there were only two firms in the markets, this is a duopoly with a high HHI compared to the figure

in 2010 where HHI is only 0.3. This figure indicates that the market is oligopolistic. Liberalisation of the market and the increase in the inflow of FDI in Tanzania has led to the removal of the monopoly and duopoly powers in the telecommunications markets.

The Normalised Herfindahl is the HHI weighted by the number of firms in the market. It is slightly lower than the HHI but it shows the same trend as HHI. The index indicates that there is a fall in market power from the hands of a few firms and competition increased in the market than it was in 1994.

Both measures of competition show that as more firms are established in the telecommunications market of Tanzania, there is a tendency to move towards a more competitive market than it was in the 1990s and years before that.

**Figure 12**: **Trend of Total Employment, HHI, CR3 and CR4**
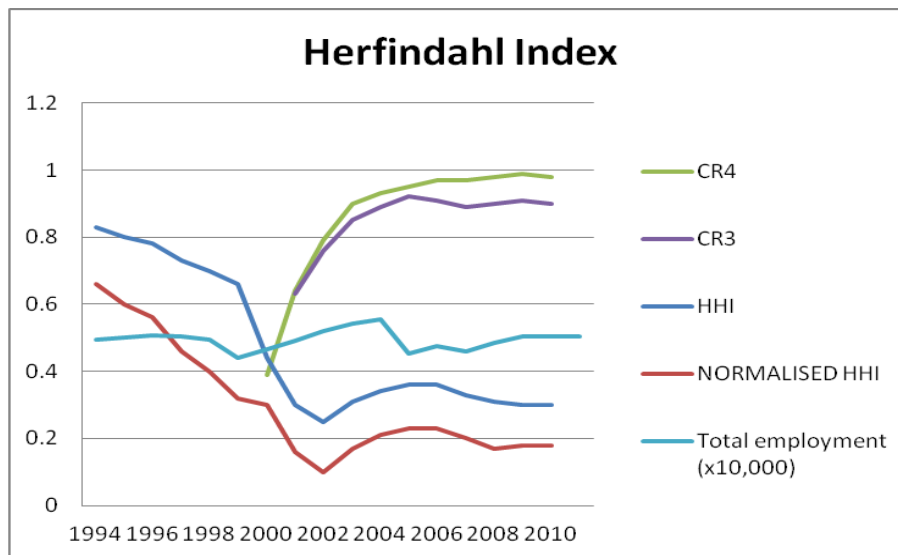
*Source: Computation from TCRA website data*

The figure above show variations in competition in the market and the employment level in the industry. It indicates that as competition increases in the market, employment remains more or less the same. Even as more and more firms are introduced in the market, the change in the level of total employment in the market is not as significant. This can be due to hiring and firing as well as labouur turnover in the industry. Moreover, during competition, employers may decide to cut costs by employing less wage/salary workers, this contributes to the level of employment being almost rigid in the telecommunications market. another factor might be a contributing factor to this situation is the hiring of casual labour or temporary labour. This act increases employment in the market for a short while and when the employers do not need their services anymore they no are fired. It can also be said that, the telecommunications firms contribute to increase in market employment but not on permanent contract basis, permanent employees are fewer in the market than expected. For example, the researcher expected Tigo and Airtel to have as many employees as Vodacom because the both started operating around the same time and tigo operated even more years before the other companies did and they also have a hign number of subscribers, but these two companies (Tigo and Airtel) have much less employees compares to Vodacom.

On the other hand, for the case of TTCL, it ranks low in the number of subscribers it has but it is the top employer in the market. with employees as many as those of Vodacom. This is as suggestion that, the market share a company holds in the market is not an indication of its contribution to the levvel of employment in the telecommunications market.

Statistics also indicate a falling average revenue per user (ARPU) in the market. An example of data obtained from the internet for the years 2006 to 2009 for Zain (Airtel) and Vodacom show a fall in the average revenue per user for these two firms of alsmost half the value of 2006.

**Table 8: Average Revenue per User (ARPU)**

| ARPU | AIRTEL ($) | VODACOM ($) | MARKET AVERAGE (TZS) |
|------|-----------|-------------|----------------------|
| 2006 | 12 | 8.1 | 24,480 |
| 2007 | 11 | 7.0 | 86,913 |
| 2008 | 9 | 5.9 | 117,045 |
| 2009 | 6 | 4.2 | 66,806 |

*Source: TRCA Website*

The table above shows an initial rise in the average revenue per user in the whole market but in 2009 a decline was recorded. The statistics from Zain and Vodacom indicate that there is an overall fall in the ARPU due to an increase in the number of 'low-usage' customers, economic conditions that force people to reduce on communication spending as well as stiffening competition which forces firms to reduce tariffs so as to gain customers.

## 5.2. Empirical Findings

The regression results include models of simple OLS analysis as well as Fixed Effects analysis to control for the firm specific characteristics that might lead to bias in the OLS regressions. First, the dissertation used simple OLS on employment (represented by log of number of employees) and explained by two variables, the number of subscribers (log subscribers) and the market share. Then, HHI was added to represent competition in the market and at last firm size was accounted for controlling for large firm. The same equations were used in fixed effects regressions with the group variable being 'firm'.

**Table 9: Regression Results**

| Dependent Variable Log of number of employees | OLS1 | OLS3 | OLS3 | F-Effect1 | F-Effect3 | F-Effect3 |
|---|---|---|---|---|---|---|
| Log Subscribers | 0.186*** | 0.204*** | -0.019 | 0.127*** | 0.208*** | 0.085*** |
| | (4.21) | (3.24) | (-0.51) | (3.49) | (4.10) | (2.78) |
| HHI | | 1.022 | -0.169) | | 1.512** | 0.655* |
| | | (0.95) | (-0.31) | | (2.22) | (1.67) |
| Market Share | 2.937*** | 2.619*** | 0.856*** | 0.931*** | 0.324 | 0.628*** |
| | (5.52) | (4.16) | (2.61) | (3.37) | (0.84) | (2.86) |
| Medium | | | -1.585*** | | | -0.628** |
| | | | (-12.92) | | | (-2.56) |
| Small | | | -3.226*** | | | -2.191*** |
| | | | (-14.73) | | | (-8.60) |
| Round1 | -0.882 | 0.144 | -0.169 | -0.200 | 0.165 | 0.042 |
| | (-0.21) | ((0.30) | (-00.76) | (-1.03) | (0.66) | (0.30) |
| Round2 | -0.075 | 0.196 | -0.283 | -0.145 | 0.239 | 0.080 |
| | (-0.18) | (0.38) | (-1.25) | (-0.76) | (0.95) | (0.55) |
| Round3 | -0.129 | 0.170 | -0.205 | -0.164 | 0.081 | 0.046 |
| | (-0.30) | (0.15) | (-1.00) | (-0.87) | (0.38) | (0.38) |
| Round4 | -0.090 | 0.071 | -0.088 | -0.104 | 0.066 | 0.101 |
| | (-0.21) | (0.15) | (-0.45) | (-0.55) | (0.33) | (0.88) |
| Round5 | -0.089 | 0.046 | -0.287 | -0.082 | 0.030 | -0.161 |
| | (-0.21) | (0.10) | (-1.46) | (-0.43) | (0.16) | (-1.45) |
| Round6 | -0.113 | 0.011 | -0.184 | -0.069 | -0.007 | -0.122 |
| | (-0.26) | (0.02) | (-0.94) | (-0.35) | (-0.04) | (-1.12) |
| Round7 | -0.143 | 0.003 | -0.120 | -0.071 | -0.002 | -0.084 |
| | (-0.33) | (0.01) | (-0.60) | (-0.35) | (-0.01) | (-0.75) |
| Round8 | -0.124 | 0.036 | 0.040 | -0.034 | 0.040 | -0.021 |
| | (-0.28) | (0.08) | (-0.20) | (-0.16) | (0.19) | (-0.18) |
| Round9 | -0.056 | 0.127 | 0.044 | 0.039 | 0.137 | 0.049 |
| | (-0.13) | (0.28) | (0.23) | (0.20) | (0.72) | (-0.44) |
| Constant | 3.423*** | 2.759*** | 7.789*** | 4.537*** | 3.017*** | 5.485*** |
| | (7.21) | (3.27) | (12.80) | (11.18) | (3.82) | (10.47) |
| Observations | 79 | 79 | 79 | 79 | 79 | 79 |
| R-Squared | 0.55 | 0.62 | 0.92 | 0.57 | 0.54 | 0.79 |
| Prob > F | | | | 0.000 | 0.000 | 0.000 |

Significance * 10%, ** 5%, *** 1%    (Robust t-statistics in parentheses)

## 5.3. Interpretation of the Results

The first OLS regression results indicate that the number of subscribers and the market share are significant at 1 percent in explaining changes in employment. The employment elasticity due to the number of subscribers signifies that 1 per cent increase in the number of subscribers, increases employment in a firm by 0.19 percent; whereby 1 percent increases in the market share increases employment by 2.94 per cent. When HHI is used in the OLS model, the variable is insignificant at all level while it shows a 1 per cent increase in competition increases employment by 1.02 per cent. This increases the elasticity of employment due to the number of subscribers to 0.20 and reduces that of market share to 2.62 while significance remains at 1 per cent. Moreover, when firm size is used in the OLS regressions, the number of subscribers is now insignificant and competition remains insignificant at all levels; the results show that an increase in the number of subscribers by 1 percent will reduce employment by 0.02 per cent and an increase in competition by 1 percent will reduce employment by 0.17 per cent. To analyse the effect of firm size on the model, a medium and small firm variables were used while controlling for a large firm. The results indicate that a large firm has more impact on employment due to all the factors in the model as compared to a medium and small firm. Specifically, a medium firm has 1.59 per cent lesser impact than a large firm while a small firm has 3.23 per cent lesser impact compared to a large firm all at 1 per cent significance. In the first regression as well as regressions containing firm size, year

2001 to 2009 have a lesser impact on the variables compared to 2010 and the impact is insignificant. When competition is used in the model without accounting for firm size, all the years have more impact than 2010. The hypothesis that competition is a significant factor in explaining employment is rejected at 1 per cent when using OLS.

Using fixed effects, there is a significant change in the coefficient estimates. In the first regression, the results show that when there is a 1 per cent increase in the number of subscribers and market share, they each increase employment by 0.13 per cent and 0.93 per cent respectively both at 1 per cent significance. Competition is added in the equation and is now significant at 5 per cent and increases employment by 1.51 percent when competition increases by 1 percent while market share increases employment by 0.32 per cent when it increases by 1 per cent but it is not significant at all levels. When firm size is accounted for, the elasticity of employment due to the number of subscribers is reduced to 0.09 and is significant at 1 per cent; that of competition to 0.66 and significant at 10 per cent while that of market share is now significant at 1 per cent and increases employment by 0.63 per cent when it increases by 1 per cent. However, a large firm has 0.63 per cent and 2.19 per cent more impact on the variables compared to medium (5 per cent significance) and small (1 per cent significance) respectively. In the first fixed effects regression, years 2001 to 2008 have lesser impact on the variables with reference to 2010 while 2009 has more impact than 2010. For the second regression only year 2006 and 2007 have lesser impact than 2010 while the rest have more impact.

In the third regression 2001 to 2004 and 2009 have more impact than 2010 while 2005 to 2008 have lesser impact compared to 2010.

It will be recalled that the first hypothesis tested in this study is whether there exists a positive correlation between competition and employment in the telecommunications market. Using OLS method the null hypothesis is rejected indicating that competition has no effect on employment. On the other hand, using fixed effects the results suggest that 1 per cent increase in competition is associated with 0.66 increases in employment. Therefore our hypothesis appears to have strong support at 5 per cent.

The second hypothesis that there are firm specific characteristics that affect the model estimation is tested by the fixed effects hypothesis that all firm specific characteristics are equal to and zero was rejected at 1 per cent indicating that there are firm specific characteristics that bias the OLS results.

The third hypothesis questions if there are gains to employment due to competition in the telecommunications industry and this is tested by two approaches. The first approach is a simple descriptive analysis. In particular, qualitative questions were asked to managers of the companies and the workers on whether they think competition is beneficial for employees or not. Findings in relation to this approach are that there are gains to employment due to competition because companies improve working conditions and remunerations. In the second approach, the proof of the first and second

approach implies an acceptance of the third hypothesis that there are gains to employment; as long as hypothesis 1 holds, then hypothesis 3 cannot be rejected.

The OLS results indicate that there is a bias in the model because the results first show that competition is not an important factor in the market affecting employment, the change that is observed in the fixed effects model reveal that there are some firm fixed factors which affect changes in firm level employment that might be overlooked if the market is examined as a whole, without taking these factors into account. Moreover, the size of the firm matters in affecting employment, a small firm cannot make a large impact on the market as compared to a large firm, the same goes for a medium firm.

## 5.4. Comparison with Other Empirical Studies

Compared to other empirical findings, some of the studies concur with the empirical findings of this study while others do not. Studies which used analytical or OLS method of cross-sectional data revealed that employment increased with competition in the market but one study which showed a decrease in employment due to increase in competition. For those which used panel data and controlled for country specific fixed effects; two studies showed that competition led to a decrease in employment while two more suggested an increase in employment due to competition. This study used panel data and took into account the effect of time on the variables (this was not accounted for in any of the reviewed studies neither did they account for firm size in their models).

## 5.5. Summary of the Chapter

This chapter gave the descriptive and empirical results of the study undertaken as well as the description of these results. A significant and positive correlation of employment and competition is found. The following chapter will give a summary of the whole study, limitations faced, and main conclusions from the study as well as policy recommendations in relation to the study in question.

# CHAPTER SIX

# SUMMARY, POLICY IMPLICATIONS, RECOMMENDATIONS, AND FURTHER RESEARCH AREAS

This chapter provides the summary (main conclusions) of the study, the comparison of theory and evidence from the study, the limitations of the study, the policy implications and suggestions for further research in the area; the discussion in organized into five sub-sections. The first sub-section presents the main conclusions of the study; the second sub-section gives the comparison of theory and evidence form this study. The third sub-section discussed the limitations of the study. Policy implications and recommendations are presented in the fourth sub-section. Further research areas are discussed in the last sub-section.

## 6.1. Main Conclusions

The study intended to examine the impact of telecommunications market competition on employment in Tanzania. The study was influenced by the increased number of telecommunications firms in the country which engage in open competitions through promotions and intense advertising. The critical question is 'has competition increased firm level employment in Tanzania telecommunications market?' Panel data was used to tackle the question with an employment equation explained by competition index. Here competition entered the model as the Herfindahl-Hirschman Index. Major findings

from the study indicated that OLS estimates were biased and that there are significant firm fixed characteristics that obscure the OLS results. This is evident from the non-significant coefficient estimates of competition index which turned out to be significant with fixed effects model. OLS estimates show that 1 per cent increase in competition increases employment by 1.02 per cent. However when firm fixed effects are controlled for, the model reveals robust positive correlation between competition and employment; and that 1 per cent increase in competition increases employment by 0.66 percent. The results are highly significant at 5 per cent.

The main conclusions that can be drawn from the study are that competition in the telecommunications industry is increasing over the years and that this competition is good for employment in the country. Further, when competition increases in the industry, workers gain by finding more alternative companies to work for if they see a possibility of better wages and better working conditions.

## 6.2. Theory versus Evidence from this Study

The theory linking competition and employment both agrees that competition is good for employment and also disagrees. Evidence form this study suggest a positive and significant link between competition and employment in the telecommunications industry. The evidence therefore agrees with the positive effects of competition on employment. That is, as more firms are introduced in the market and competition is

more favourable, there is a tendency for firm level employment to increase and hence lead to an overall positive effect on employment in that industry.

## 6.3. Limitations of this Study

The study was limited by the availability of data from the national institutions as well as the reluctance of some of the firms to cooperate in giving the researcher the needed data. Therefore, the researcher had to change some of the methodology for analysis of the study. Moreover, funds were not enough for data collection and analysis and for other processes in the course of carrying out the study; the researcher had to use what was available at the time. Another limitation is that the time allocated to carry out the study was not enough, if perhaps there was more time allocation, the researcher could have gotten more data from the concerned institutions and make the study more interesting and with better results.

## 6.4. Policy Implications and Recommendations

As far as policy is concerned, the implication is that competition is good for employment; therefore the nation should make sure that proper measures are in place to promote competition in the industry so as to increase employment. However, not everyone is employed in this industry but those with specific skills needed to work in the telecommunications industry, therefore promoting competition alone will not increase

jobs in this industry but it should go hand in hand with training people with education and skills needed in the industry.

This dissertation also recommends that the government to encourage more investments in the telecommunications industry as well as investment in education related to this industry. Moreover we recommend an encouragement and give incentives to Tanzanians so that they can also be able to invest in such an industry, even though it requires such a large amount of initial capital, it Tanzanians could invest in television broadcasting which also requires large capital, they can also invest in telecommunications. It was evident from the questionnaires that most of the employees are Tanzanians, this is a fact that the government has to be commended for because of the rule that foreign employees should only be technical experts and not those who do jobs that Tanzanians can do.

## 6.5. Further Research Areas

Some of the areas that need further understanding as compared to the study that was done by the researcher are: the impact of competition on wages in the telecommunications industry; even though in this study there is a positive impact of competition on jobs, what is the effect on wages? Another area is the impact of mobile banking of the telecommunications companies in relation to competition in the banking industry, the telephone companies are increasingly engaging in financial activities, but

what is the economic impact of this service on the banking industry.  Moreover, another area that can be researched on in relation to this study is rural-urban competition; most of these companies are dominating the urban market, what happens in rural markets in relation to competition?  The same question addressed here could also be addressed using another measure of competition and compare which one is favourable and whether or not they yield different results.

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