

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

KNUST

ASSESSING THE IMPACT OF INFORMATION TECHNOLOGY (IT)

INVESTMENT ON BUSINESS PROFITABILITY

(CASE STUDY OF SELECTED COMMERCIAL BANKS IN GHANA)

BY

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**THESIS SUBMITTED TO THE DEPARTMENT OF ECONOMICS OF THE
COLLEGE OF SOCIAL SCIENCES AND HUMANITIES, KWAME NKRUMAH
UNIVERSITY OF SCIENCE AND TECHNOLOGY, IN PARTIAL FULFILLMENT
OF THE REQUIREMENT FOR AWARD OF MASTER OF SCIENCE DEGREE IN
ECONOMICS.**

JUNE, 2016.

DECLARATION

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

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DEDICATION

This piece of work is the culmination of my interest, thought and pondering. I could never have completed such a work without the support of my wonderful family and friends. To my daughter, Victoria Amofoa Onwona-Agyeman (Adwoa Empress Junior), My mum Emma Gertrude Amofoa Onwona-Agyeman (Adwoa Empress Senior), Dad, all siblings especially, Bernard, Agatha, Benedicta, Mary, Ruth, Nhyira and YOU



ACKNOWLEDGEMENTS

As I reflect on my journey toward completing this work, I realize that the best advice I received which guarantees an expression of profound gratitude was from Dr Yensu Joseph, my supervisor, Dr (Mrs) Grace Ofori-Abebrese and Dr Kamarah (Assessors) whose patience and relentless efforts as well as his provision of useful and valuable suggestions made this study a useful one.

I appreciate the diligence and excellent advice from Dr Eric Arthur, Dr Jacob N, Messrs, Kofi Owiredu Ghorman and Wife, Yaw Twimasi, Adwoa Marfoa Linda, Rita Antwi (Obaapa), Samuel Kumi Lamptey, Francis Santaa, Jennifer Nartey, Mavis Serwaa, Onwona-Agyeman Diawuo Dada of Nkawkaw, Alhaj Yakub AB Abubakar, (Headmaster T. I. AmassKumasi) and all friends and relatives whose diverse assistance and valuable inputs assiduously provided exceptional guidance and support above and beyond expectations in this accomplishment.

I must acknowledge the management and staff of all the banks whose outfit was used for this study. I further deem it an honour to acknowledge the support from Ghana Stock Exchange where I obtained the various financial statements for this study. I had much help, support, and guidance from university personnel, friends, coworkers, and. I am very much grateful for their input, support, and insight.

Last but not least, I could not have succeeded in this endeavour without the unconditional love and support of my family for their prayer and financial support.

ABSTRACT

This study was to provide empirical evidence on how investment in Information technology impact on business profitability using GLS regression model. (Clark, J.A. 1986; Ko, M., & Bryson, K. M., 2002). It was done by testing the significance of the choice variables (loans, deposit, expenditure on information technology and Bank of Ghana prime rate) on business profit.

The rationale behind this work was to contribute and possibly put an end to the on-going debate on the exact impact of IT investment on firms' profitability.

The methodology focused on using financial ratios such as return on assets, return on equity, profit margin to assess business performance (Dehning & Richardson, 2002; Li & Johnson; 2002)

The study uses panel dataset from the five commercial banks over a period of nine years from 2006 to 2014.

The study found out that expenditure on information technology has no direct significant influence on profitability of the commercial banks.

The study therefore recommends that commercial banks in Ghana should take a second look at continuous investment in information technology, as it may not necessarily give them the profit they are through thick and thin looking for directly.

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CHAPTER ONE

INTRODUCTION

1.0 BACKGROUND TO THE STUDY

Information Technology, which refers to the various ways by which data is processed, stored and shared to support decision making in all spears of life is the integration of computer and telecommunication technologies. It is made up of both the hard and soft technologies such as network, software, hardware, database of expert systems, communication equipments as well as the media used to distribute information to enhance decision to support economic growth and development (Laugdon and Laugdon, 2006).

Throughout human eon, technology has been indispensable and very important tool for the advancement of humanity (Coombs et al., 1987). Technology has assisted many executives and other decision-making personnel to easily analyze and solve complex problems for the betterment of their lives and organisation.

Admittedly, Information Technology (IT) and all its sub branches and systems including the underlying technologies employed by organisations have affected the banking sector in all economies (Laugdon and Laugdon, 2006) of which Ghana is no exception. (Josiah and Nancy, 2012).

The deployment of Information Technology in Ghanaian banks has increased as it helped to improve enormously the operational performance, services and products. Through electronic banking products such as deposit machines, Automated Teller Machine (ATM), debit and credit cards, telephone banking, Closed-Circuit television, internet banking, mobile banking, etc., banking services are now ubiquitous (Kelley, 1989; Dannenberg and Kellner, 1998; Ovia, 2001; Bauer et al., 2005; Lee and Lin, 2005).

Information Technology has helped to reduce the banks cost of operations, standardised their core services, given easy access to customers accounts, saves time, surviving in competition, mass customization of products, marketing, communication. These helped to attract and maintain consumers (Rai, A et al.,1997; Li Y., 2000; Lee and Lee, 2001; Chang, 1995; Flamini V. and McDonald C. and Schumacher 2009; Josiah and Nancy, 2012).

Ghanaian commercial banks, which hitherto were only using telephone, facsimile, telex to speed up communication to aid customer service, in the wake of competition, resorted to the use of personal computers for back office operations and to tellers-clients services all in attempt to satisfy clients.

Advancement of information technology has changed the landscape of banking in Ghana, banks have networked their branches and operations in line with the “one-branch” philosophy which the use of Automated Teller Machines (ATMs) have further entrenched. Customers do not necessarily need to go to their branches in order to do banking businesses.

It must be noted that since the first ATM was installed by the Trust Bank Ghana in 1995, most of the banks thereafter have installed and networked their ATMs in competition making the ATMs the single most successful delivery medium for clients in Ghana (Abor 2004).

In addition to the networks and ATMs, another IT product that has helped changed the face of Ghanaian banking is the introduction of various electronic cards that the banks have developed over the years.

The “Sika Card” by Social Security Bank now Societe Generale (Ghana) in May 1997, the Standard Chartered Bank (Ghana) debit card in early 2001, which function, has now been integrated with customer ATM cards, the November 2001 “E-Card” by the consortium of three banks (The Trust Bank, Ecobank and Cal Merchant Bank).

PC Banking -where corporate clients are given proprietary software by the banks so that they could access their account from their offices via the internet- and Telephone Banking -where customers can call to inquire about products, lodge complaints, request chequebook or account statements, etc.- have also contributed greatly.

The commercial banks in Ghana are still investing substantial amounts in information technology resources (products and programs) to upgrade their infrastructure in order to provide these new electronic information-based services. This will make them efficient, stay ahead of competitors, enlarge and maintain market share, increase profit and sustain the advantages that investment in information technology (IT) brings to their firms and the industry as a whole. (Dannenberg and Kellner, 1998; Ovia, 2001; Bauer et al., 2005; Lee and Lin, 2005; Domeher et al, 2014).

It is important to note that most banks in Ghana do not compute return on investment (ROI) on information technology as they do for expenditure on other assets or ignores the social and subsystem costs and benefits of information technology investments in performance appraisal (Ryan, et al.,2008).

More importantly, the early researches failed to show consistent relationship between investment expenditure on information technology and any well-known measure of profitability, (Strassman, 1990; Weill, 1992; Brynjolfsson, 1993; Brynjolfsson and Hitt, 1996).

Whiles studies from scholars such as Brynjolfsson and Hitt, 1993; Brynjolfsson, 1993; Mandel, 1994; Magnet, 1994; Brynjolfsson, 1995; Lichtenberg, 1995; Brynjolfsson and Hitt, 1996; Daniel, 1999; Lee et al., 2000; Bitler, 2001; Black et al., 2001; Lim, J. H., Richardson, V.J., & Roberts, T.L. 2004; Kariuki ,2005; Damanpour et al, 2009) have provided enormous evidence of a positive relationship between IT investment, Productivity and Profitability.

However, other works from Solow, 1987; Schneider, 1987; Strassman, 1990; Kemmerer and Sosa, 1991; Bakos and Kremer, 1992; Dos Santos et al. 1993; Loveman, 1994; Brynjolfsson and Yang, 1996; Brynjolfsson and Hitt, 1996; Dewan, S., C. Min. 1997; Strassman, 1997; Dewan, S., C. Min. 1997; Dewan, S., and Kraemer, K.L 1998; Dewan, S., Kraemer, K. 2000 have negative relationship between IT investment and Productivity and Profitability.

These have made most managers and business owners committing huge sums of financial resources into Information Technology do not come without much hesitation.

1.1 STATEMENT OF THE PROBLEM

Information Technology (IT) solutions providers offer wide range of programs and services to the business community especially the Cloud Service Providers of clouds computing technology have replaced the conventional applications and other software installed on the personal computers of end-users, which have provided enormous benefits to businesses.

The benefits include reduction of initial high costs of capital expenditure on IT equipments, resilience, flexibility, virtualisation of computing environment, efficiency, optimal and scalable use of IT hardware and software (Evangelinos C, C. Hill, 2008). The available of applications and services on demand users regardless of their location and devices is an added advantage. (Ajayi, S. I. and Ojo, O. O.,2006;Akhalumeh, P.B. and Ohiokha, F. 2012) which should encourage the business community including the banks to invest more in Information Technology.

However, the debate on whether or not the investment in information technology (IT) provides any significant improvement in productivity, profitability, efficiency in business and hence economic growth is still ongoing.

Researchers' interest in the 'productivity paradox' has recently generated a lot of other research works on the "paradox" as some research works were branded as "computer age can be seen everywhere, but not in the productivity statistics." (Solow, 1987; Bakos and Kremer 1992).

These early researchers failed to show exact correlation and impact of expenditure on information technology and any acceptable measure of productivity (Strassman, 1990; Weill, 1992; Brynjolfsson, 1993; Brynjolfsson and Hitt, 1996).

However, other researchers have provided contradictory findings on the phenomenon evidence at the firm level that information technology investment produce gargantuan returns. Lim, J. H., Richardson, V.J., & Roberts, T.L. 2004; Mandel, 1994; Magnet, 1994; Brynjolfsson and Hitt, 1993, 1995; Lichtenberg, 1995. Their findings were proclaimed as "productivity surge" in the Business Week and "technology payoff" in the Fortune media. Additional works by Kariuki, 2005; Damanpour et al, 2009 have also indicated that information technology has encouraging impact on financial performance of banks using bank turnover and profits as measure of performance.

They concluded that banks with high IT investment turn to have high profit growth, hence the debate.

It is important to note that even though studies have been conducted using some selected commercial banks in Ghana that have affirmed the positive impact of information technology investment on the banks profit. (Harvey and Osei 2010; Opong 2015), the debate has made most managers of commercial banks reluctant to commit a lot of investment into information technology (IT) despite all the hype about the perceived benefits surrounding the use of information technology in business.

It is as a result of this strange behaviour of the commercial banks managers that motivated the researcher carried out this study to investigate the impact of information technology investment on commercial banks profit.

1.2 OBJECTIVES OF THE STUDY

Assess the impact of information technology investment on the profits of Commercial Banks in Ghana but specifically will want

- To examine the trend of business profits
- To measure the impact of information technology investment on the profits of Commercial Banks in Ghana
- To examine the information technology investment paradox.
- To provide answers to the following questions;
 - ✚ What is the impact of investment in Information Technology on the deposit of commercial banks in Ghana?
 - ✚ What is the relationship between Bank of Ghana prime Rate and profit of commercial banks in Ghana?

1.3 HYPOTHESES DEVELOPMENT

The importance of Information Technology (IT) in the lives of many in this 21st century cannot be over emphasised. Businesses including the commercial banks use the services of IT solutions providers especially the Cloud Service Providers that have replaced the conventional applications and other software installed on personal computers of end-users to advance their business operation.

The benefits from Cloud Service which include reduction of initial high costs of capital expenditure on IT equipments and its associated expenses, resilience, flexibility, virtualisation of computing environment, efficiency, optimal and scalable use of IT hardware and software, expertise management of all computing resources. (Evangelinos C, C. Hill, 2008) coupled with

the fact that the IT processes, applications and services are made available on demand users irrespective of the location and devices of the user. (Ajayi, S. I. and Ojo, O. O.,2006;Akhalumeh, P.B. and Ohiokha, F. 2012)

These merits have encouraged the business community including the commercial banks to invest more in Information Technology to underscore the hypothesis that:

H₀: IT investment makes direct significant impact on commercial banks profit.

H₁: IT investment does not make direct significant impact on commercial banks profit.

1.4 SIGNIFICANCE OF THE STUDY.

The productivity paradox associated with information technology investment has generated a lot of debate in the circles of academia and industry. This has triggered several studies in attempt to provide empirical evidence to end the debate.

Some scholars have provided enormous evidence of a positive relationship between IT investment, Productivity, and Profitability. (Brynjolfsson and Hitt, 1993; Mandel, 1994; Magnet, 1994; Bitler, 2001; Kariuki ,2005; Damanpour et al, 2009), others have given negative relationship between IT investment and Productivity and Profitability. (Solow, 1987; Schneider, 1987; Strassman, 1990; Kemmerer and Sosa, 1991; Dewan, S., and Kraemer, K.L 1998; Dewan, S., Kraemer, K. 2000).

This study would therefore provide new evidence regarding the impact of information technology investment on business performance to enable managers of companies to make informed decision regarding investment in information technology.

In addition, the study would provide a guide to information technology companies providing IT business solutions to direct their investment into specific products that would be patronized by the business community.

The guide would again direct the investor communities on how information technology can increase productivity.

Finally, to the academia, further documented evidence on the productivity paradox would be added to the literature.

1.5 SCOPE OF THE STUDY

The study mainly covered nine-year period (2006-2014) using five commercial banks in the country. The study could not cover all commercial banks due to time and other logistics constraints.

The motivation for the chosen area of study was the fact that little has been done on the topic in Ghana.

In addition, the selected commercial banks are listed on the Ghana Stock Exchange and as such, its shareholders, other investors, financial analysts and all other users of financial information might find the study interesting and useful.

1.6 ORGANISATION OF THE STUDY

The study has been organised into five chapters. The chapter one gives the introduction to the study, a background to the study, the statement of the problem, the purpose of the study, the tentative statement to be tested (hypothesis), justification which is the researcher's motivation for the study as well as how the study has been organised.

The chapter two is the review of literature. This chapter reviewed sections of the literature and other works related to this piece of work as the means to support claims or otherwise.

The chapter three, which is on methodology, identified the concepts relevant to the work. In considering the methodology, this chapter sought to determine the research design, sample size,

sampling techniques, data collection instruments, data collection procedures and the presentation and analysis of data.

The chapter four takes care of the analysis of the results of the study. It commences with the Summary Statistics discussion, choosing of appropriate model, running the models followed by the analysis, discussion and presentation of findings using tables and charts as well as interpretation of the results of this study.

The chapter five highlights the summary of findings, commendations and conclusions surmised from the study.



CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

The perceived importance of information technology in improving productivity, profitability and business efficiency through product development, innovation and quality service delivery cannot be over emphasised (Kelley, S., 1989; Kamel, S, 2005). However, the debate on whether or not investment in information technology (IT) provides any significant improvement in business productivity, profitability, and genuine efficiency in businesses that is ongoing has generated the impetus for researches both in academics and in industry.

The literatures reviewed were made up of the summaries of previous studies carried out by other researchers on the topic that are closely related to this study, works that contributed to the “productivity paradox”, increased in profitability, basic concepts and methods of financial performance evaluation in firms.

2.1 THEORIES UNDERLYING THE STUDY

The theories underlying the study are the real option theory and the dynamic capability theory.

The dynamic capability provides a reliable framework to analyse impact of IT investments on organizational performance. The theory focuses on attributes of resources and their ability to improve the firms overall capabilities to drive improvements in business process performance to increase profit (Peteraf and Barney, 2003; Wheeler, 2002). Information technology therefore has derived demand as it is usually seen an enabler of dynamic capability that improves business process performance to grow profit (Bharadwaj, 2000). This therefore means that IT

investment would only be beneficial when it is able to impact positively on the business processes.

On the other hand, the Real Option theory, which is a modification to the Net Present Value, based on Richard Bellman's Dynamic Programming equation uses the decision tree payoff matrix to determine worth of information technology investment. This theory provides flexibility option to assist managers in investment decisions, which is lacking in the net Present Value (McFarlan, 1984; M.E. Porter, V. Millar, 1985; J.Y. Bakos, M.E. Treacy, 1986; R. Benjamin, R. Wigand, 1995; E. Scarso, 1996; Martha A, Nalin K, 1996; F.W.; J.S. Busby, 1997; T.E. Copeland, P.T. Keenan, 1998). The Net Present Value has a rigid rule of thumb which sometime leaves managers in a fix as to go when a specified criteria is not met. The real option theory in such times provides a lean way to a sound decision to the benefit of the organisation.

2.2 THE PRODUCTION FUNCTION MODEL

Most of the studies that associated investment in information technology to productivity used the Cobb Douglas production function as framework which satisfied the constrained by economic theory (conditions of quasi concave and monotonicity), (Parson et al, 1993; Loveman, 1994; Lichtenberg, 1995; Brynjolfsson and Hitt, 1996). This technique has proved to be suitable and successful in many empirical studies (Morrison and Berndt, 1990).

Production function has been used by several studies to address issues that may be related but are conspicuously different, whilst Lichtenberg, 1995 and Brynjolfsson and Hitt, 1996 used it to address the impact of information technology on productivity, Wilson, D., 1993; Barua et al. 1996 to study the impact of information technology on business profitability.

2.3 THE “PRODUCTIVITY PARADOX”

Many are of the view that the advent of information technology deployment should have many positive chain effects on the activities of both individual and businesses. (Parsons et al, 1993; McFarlen, 1984; Porter and Miller, 1985 and Cash and Konsynski, 1986).

However, one side of “productivity paradox” which suggested that information technology investment does not influence productivity. (Solow, 1987), (Brynjolfsson and Yang, 1996). Some of the studies showed impressive failures and even negative relationship between information technology investment expenditure and productivity. (Schneider, 1987; Kamerer and Sosa, 1991; Bakos and Kremer, 1992; Dewan, S., and Kraemer, K.L 1998; Dewan, S., C. Min. 1997; Dewan, S., Kraemer, K. 2000)

The literature on business value of information technology revealed that most of the studies that sought to determine the correlation between information technology investment expenditure and business profitability concluded no significant correlation between information technology investment expenditure and business profitability, hence information technology expenditure in business is not productive. (Strassman, 1990, 1997; Dos Santos et al. 1993; Loveman, 1994; Brynjolfsson and Hitt, 1996; Dewan, S., and Kraemer, K.L 1998; Dewan, S., C. Min. 1997; Dewan, S., Kraemer, K. 2000)

However, other works that sought to find out whether the benefits from information technology are seen at the firm-level or industry-level and used technology as input, and the production function to relate output to the technology (as input) painted an impressive positive picture of the impact of information technology on productivity. Brynjolfsson, (1993, 1995; Magnet 1994; Mandel, J 1994; Lichtenberg, 1995; Brynjolfsson and Hitt, 1996;

Lockett and Little, 1997; Daniel, 1999; Lee et al., 2000; Bitler, 2001). These latest findings were proclaimed as “productivity surge” due to information technology in the Business Week and “technology payoff” in the Fortune media Kariuki, 2005).

In addition, other study conducted by Information Week and Computer world Magazine that used the Cobb-Douglas production function again concluded a significant excess returns to investment in computer capital. This became evident as the expenditure on Information Systems (IS) employee yielded more than six times in terms of marginal productivity than expenditure on non- Information Systems (IS) employees Lichtenberg (1995).

Another study that used data from the International Data Group and Standard and Poor’ Compustat II database again concluded that computer capital expenditure contributes 81% marginal increase in output while the non-information technology contributing only 6% to output Brynjolfsson and Hitt (1996).

It is important to note that all the above findings were restricted to manufacturing firms and industry perhaps due to the non -availability of data at the firm-level in the service industry coupled with the difficulty of identifying what constitute output.

Notwithstanding the above, the famous work that dealt with the impact of information technology investment on productivity of the banks using a traslog production function and data from five Canadian banks, also concluded that the use of computers in the banks increased productivity between 17-23% among the banks studied (Parson, Gotlieb and Danny, 1993)

It is some of these works in the mid and late 1980s that contributed to the establishment of the “Productivity Paradox” in relation to information Technology investment.

2.4 THE “PROFITABILITY”

Information Technology is been employed by most banks to standardise core operations, improved customer service quality and delivery as well as to reduce cost of doing business so as to increase profit (Kelly, 1989; Dannenberg and Kellner, 1998; Bauer et al. 2005; Asante et al., (2011), and Domeher et al (2014).

Studies on profitability sought to determine whether investment in Information Technology deployment provides increase profit.

According to Clemons (1991) any Information Technology investment which gives some advantage to the firm over its competitors to make the firm increase profit or stock market value is a “strategic necessity” (Clemons, 2001). Most banks in Ghana are therefore investing in IT as strategic necessity.

2.5 RESOURCE-BASED VIEW OF IT AND FIRM PERFORMANCE

Many researchers have used different theoretical approaches to study the relationship between investment in Information Technology and firms’ performance over the years. Among these include the Transaction cost theory (Williamson, 1963), Value Chain Analysis (Porter, 1985) and the Resource Based View (Bharadwaj, 2000) which is most recent. According to the resource-based view approach, firms compete on the basis of their unique corporate resources that are considered to be priceless, exceptional, difficult to mimic or replaced by other resources. (Barney, 1991). The theory underlying this approach originated from strategic management research and adopted as an appropriate tool to examine the contribution by Information Technology resources in organisations. (Melville et al, 2007).

The resource-based view work with the assumption that the resource that are needed to implement strategies are heterogeneously spread across firms whose variations remain stable over time.(Barney, 2001)and These resources are defined to include; physical assets,

knowledge, capabilities, and organisational processes,(Bharadwaj, 2000). However, Grant (1991) in his work distinguished between resources and capabilities and further grouped resources into tangible, intangible and personal based.

The tangible resources are made up physical assets such as plants and equipments (including computers and other IT equipments), stock of finished goods and raw materials, etc.

The intangibles are made up of reputation, software, product quality, brand image, etc.

The personal based resources are also made up of technical know-how and other knowledge assets that have to do with organisational culture, employees training, loyalty among others.

The resource-based view theory maintained that the firms that stand to gain from information technology are those that can properly assemble, integrate and deploy information technology resources to create and sustain competitive advantage in the industry in which it operates.(Russo and Fouts, 1997; Apulo and Latham, 2011).

2.6 INFORMATION TECHNOLOGY INVESTMENT AND THE FINANCIAL INDUSTRY

Information technology infrastructure refers to the physical information technology asset stock of a business organization that forms the prime business resources for achieving long term competitive advantage.

In the circles of academia and industry many have diverse opinion on real essence of information technology investment in financial industry. Whiles some are of the view that investment in information technology creates competitive advantage for firms to make profits other think otherwise.

The findings from a study have it that information technology assets can only enhance profit via competition when it is able to outperform equivalent assets of competitors in the industry (Barney, 2001).

Other studies conducted to look at how technological advancement affect firm in the banking industry, Berger et al. (2003) found out that information technology investments led to improvement in cost reduction from the “back-office” in the form of reduced costs of operation in the organization and improved “front-office” technologies coming from customers related benefits such as superior quality and variety of banking service.

In addition, the various works by Abdullah, 1985; Shawkey, 1995; Rose (1999) Abor (2004) Asante et al., (2011), and Domeher et al (2014) confirmed empirically that investment in Automated Teller Machines (ATM) – an IT product- improved banks’ profit as the ATMs increased the volume and value of deposit accounts, reduced the banks transaction costs, number of staffs as well as the number of branches which in aggregate improved the banks’ profit.

Kozak (2005) in his study on information technology investment in some banks in USA, using return on asset (ROA) as profitability indicator concluded that the value of ROA of the banks increased by 51% to confirmed that increased in information technology investment connected to the banks’ office networks and range of services offered helped to generate additional revenues for the banks.

On the contrary, Porter (1985) also postulated that in competitive market where there is free entry and exit and information technologies are freely available to all firms, a particular firm cannot gain a sustainable competitive advantage from technologies that can easily be duplicated by competitors.

Therefore technologies can only be profitable to a firm, if and only if it can create a significant barrier to entry into its line of business; else investment in information technology will become more or less of a “strategic necessity” rather than an impetuous of competitive advantage (Clemons, 1991). He therefore cautioned that investment in information technology should not be associated with super normal profits.

2.7 INFORMATION TECHNOLOGY INVESTMENT AND BANK PRODUCTS AND PERFORMANCE

The banks in attempt to stay in competition and to increase and maintain performance are investing fortune in information technology resources to automate most of their core processes in order to help creates value for their banks and the customers. Among the products and services technologies help to managed and advanced in the banks included the Internet banking or electronic banking and its software, security management, bills payment, credit business and credit scoring, SMS, and ATMs Domeher et al (2014).

Sullivan, R. J. 2000; Furst et al. 2002a; Carlson ,2010; Morrison, C.J. and E. R. Berndt 1990; in their studies that assessed the viability between electronic banking and profitability concluded that the larger US banks using more IT technologies had higher return on equity.

Electronic banking improves banks performance via the increased in market share, expansion in product range, product customisation and better response to clients demands (Kariuki, 2005)

It is vital to note that while a section of users of information technology product and service are extremely satisfied with cost saving factor and its real time operations (Polatoglu and Ekin, 2001), others also perceived the information technology product and service to be much expensive especially those from the developing economies (Gerrard and Cunningham, 2003; Mohammad and Saad, 2011) and hence poses negative impact on its adoption; which has affected the banks performance (Sathye, 1999, 2005; Freedman, 2000; Akhalumeh and

Ohioikha, 2012; Adeniyi and Olutayo, 2015) and as reported in work of Jordan, Mohammad and Saad (2011).

However, to the banks, information technology product and service are still being adopted based on prospects of minimizing operating costs and maximization of operating revenues (Simpson , 2002) since evaluation of online banking has proved that in the developed and emerging (Jayawardhena and Foley, 2000; Frei, F.X. and Kalakota, R, 1998)

2.8 EMPIRICAL LITERATURE REVIEW

Many works have been done on the various ways information technology affects business performances using different measure of performance indicator.

Parson, Gotlieb and Danny, 1993 assessing the impact of information technology investment on productivity, using a traslog production function and data from five banks in Canada concluded that the use of computers in the banks increased productivity between 17-23% among the sampled banks.

Sullivan, R. J. 2000; Furst et al. 2002a; Carlson ,2010; Morrison, C.J. and E. R. Berndt 1990; in their studies that assessed the impact of investment in electronic banking on profitability in United State of America concluded that the larger banks using more IT technologies had higher return on equity which is a measure of profitability.

More so, Berger et al. (2003) found out that information technology investments in his studies led to improvement in cost reduction from the “back-office” in the form of reduced costs of operation in the organization, which increased profit.

Another work by Kozak (2005) in USA on information technology investment in some banks using return on asset (ROA) (profitability indicator) concluded that the value of ROA of the banks increased by 51%. This again confirmed that increased in information technology

investment in the form of banks' office networks and range of services offered generate additional revenues to increased profit.

In Iran, Hossein, A (2011) conducted a similar study using data from the Saderat bank indicated that investment in information technology helped to reduced operational cost by 41% which consequently increased the bank's profit.

Josiah and Nancy, (2012) in their studies on the impact of information technology investment on banks profit, using returns on asset (ROA) and returns on equity (ROE) as profitability indicators, concluded that investment in information technology positively impact on the profit of commercial banks in Kenya.

It is important to note that similar studies have been carried out in Ghana. Harvey and Osei (2010) in their studies on the impact of information technology investment on banking business performance, using returns on asset and returns on equity as profitability indicators, concluded that investment in information technology positively impact on the profit of commercial banks in Ghana.

In addition, the various works by Abor (2004) Asante et al., (2011), and Domeher et al (2014); Ankrah (2014) confirmed empirically that investment in information technology and its related products such as Automated Teller Machines (ATM), online banking and other ebanking products improved banks' profit.

2.9 BANK PERFORMANCE INDICATORS

Many researchers over the years have used different measurement approaches to assess the performance of financial institutions; among the measures used are Financial Ratios Analysis,

Regression Analysis, Analytical Hierarchy Process (AHP) Balanced Scorecard (BSC), Total Production Analysis, Delphi Analysis, Analytical Network Process, Data Envelopment Analysis (DEA) etc.

2.9.1 THE BALANCED SCORED CARD (BSC)

The balanced scorecard by Kaplan and Norton measures organisational performance from the perspective of financial, customers, internal business processes and learning and growth in relation to accounting and finance, marketing, value chain and human resources. It provides managers with instrumentation tools needed to steer organisational activities towards future competitive success. (Kaplan and Norton, 1992, 1996; Hung-Yi, et al., 2009; Amiri et al., 2012).

In performance measurement the balanced scorecard balances both financial and nonfinancial measures (Norton et al., 1997 Amiri et al., 2012) with all the four key perspective serving as the common language to help bring into line top management and employees' activities to the organisation' general vision.

The balanced scorecard is very effective in guiding organisation to control performance effectively and to forecast future profitability especially when considered in non-financial measures (Mouritsen et al., 2005; Hung-Yi, et al., 2009; Amiri et al., 2012).

For instance banks use the balanced scorecard as a frame work to develop and assess strategies, with a well specified strategic objectives and performance measures the balanced scorecard can be used to transform the strategies into action.

In addition, the balanced scorecard provides a way to monitor and measure key financial performance drivers that ensure successful execution of strategies as well as used as efficient tool to ensure banks constantly improves on its systems and processes (Amiri et al., 2012; Hung-Yi, et al., 2009)

It is on records that the balanced scorecard method has been used by many to assess the performance of financial institutions. The chief among includes; the work of Kim and Davidson (2004) used the balanced scorecard to assessed the performance of information technology investment in the banking industry using the t-test and regression models.

The perspective of the balanced scorecard was also used by Hung-Yi, et al., (2009) to construct key performance appraisal indicators mobility of the service industries via the fuzzy Delphi method.

2.9.2 ANALYTICAL HIERARCHY PROCESS (AHP)

The Analytical Hierarchy Process (AHP) approach for performance evaluation is employed when dealing with interactive activity environment, it assumes the system elements which form the basis for evaluation are not correlated but are unidirectionally influence by hierarchical relation.

However this method does not allow feedback among the interdependence elements that are used for the analysis. This is the models main limitation (Saaty, 1996).

2.9.3 ANALYTICAL NETWORK PROCESS (ANP)

The Analytical Network Process (ANP) approach for performance evaluation is a comprehensive decision making technique that has the capacity to include all the relevant criteria which have some bearing in arriving at descisions (Saaty, 1996).

It uses the idea of stochastic transiting process to identinfy the interdependence between two groups of elements. It first calculates the relative importance of the balanced scorecard performance for the performance evaluation of the banks with respect to each of the success factors after which the the relative importance of those BSC performance and weights of their corresponding balanced scorecard indexes are used for the performance evaluation

The Analytical Network Process (ANP) approach for performance evaluation is usually employed when dealing with interactive activity environment (Saaty and Takizawz 1986). It is effective in handling all types of interdependence relations among layers of elements systematically.

It is vital to note that the Analytical Network Process approach eliminates the limitation of the Analytical Hierarchy Process (AHP) by allowing feedback relationship among elements at different layers and interdependence between elements at same layer via the developed “supermatrix”.(Saaty, 1996).

2.9.4 FINANCIAL RATIOS ANALYSIS

Financial ratios are ratios of selected values on an organization’s financial statements (Garrison and Noreen, 2003). They express the association between some specific items on the organisation’s financial statements.

Admittedly, there are numerous ratios that can be computed from any given set of financial statement for various use, but the expertise lies in knowing which ratio(s) provide what is relevant information to support decision making.

The intrinsic worth of ratios for financial statements interpretation and analysis is appreciated only when applied properly. Elliott and Elliott (2006). Ratios when applied wrongly can produce useless and misleading consequences.

To overcome these limitations of traditional ratio analysis, according to Elliott and Elliott (2006) Z-score analysis can be employed as it can evaluate corporate stability and more importantly, predicts company’s financial health (Eidleman, 1995).

However, ratios when used properly are very powerful tools for understanding and interpreting organisations’ financial statements (Brigham and Earnhardt, 2002).

2.9.4.1 LIQUIDITY RATIOS

A liquidity ratio measures the ability of an organisation to meet its financial obligation at maturity. Liquidity ratio is made of the current ratio and the quick ratio.

Current ratio measures the ability of an organisation to meet its current maturing financial obligation as the fall due (Watson and Head, 2007). It is computed by dividing the total current assets by the total current liabilities.

It is vital to note that since not all current assets are readily convertible to cash, the quick ratio is usually used to budget for very short term financial obligations (Brealey et al., 2001)

Therefore when the current ratio is adjusted by deducting the total stock amount from the total current assets before dividing the net by the total current liability we arrive at the quick ratio.

The rationale for the quick ratio according to Brealey et al., 2001 is that since some assets are closer to cash than others, in times of difficulties, those far from cash cannot be sold above fire-sale price, hence the need for the quick ratio. They also admonished managers to eschew from including less liquid components of current assets when comparing current assets to current liabilities and focus on cash and other marketable securities and bills.

2.9.4.2 PROFITABILITY RATIO

This refer to the ratio that shows how successful an organisation is generating profit.(Waston and head, 2007).

Profit Margin which does not make distinction among operating costs, administrative costs and distribution costs shows the level of competence with which cost is guarded to generate profit.

Among the ratios that are used to measure profitability in organisation includes; the profit margin, profit to sales ratio, Return on Asset (ROA). Return on Equity (ROE), etc.

Return on assets (ROA) indicates the overall profitability relative to all the assets utilised by an organization. It is measured by dividing the organisation net income by the total assets (Watson and Head, 2007).

Return on Equity (ROE) is profitability ratio that provides shareholders the insight into how well management is effectively managing funds that they have invested into equity.

It compares the earning on ordinary shares to the book value of shareholders investment (Bribham and Ehrhardt, 2002)

2.9.4.3 CASH FLOW PREDICTION OF PERFORMANCE

Cash flow is the lifeblood of every organisation and the essence of its very existence. The importance of cash flow in estimating the success of organisations cannot be over emphasised (Gentry, 1984, 1985; Bernard and Stober, 1989; Carslaw and Mills, 1991) and hence any activity that would impede the smooth inflows and outflows of cash is likely to jeopardize the survival of the organisation (Largay and Stickney, 1980).

It is important to note that every organisation's performance and the volume of net cash flow (cash inflows and outflows) are closely correlated and also link to information systems (Connel and Saleh, 2004), hence any activity that will impede the organisation's ability to generate enough cash from its operation is likely hamper growth in such an organisation (Altman and Spivack, 1983; Gentry, 1985; Rayburn, 1986;)

Therefore improvement in Company's financial management can significantly improve business performance (Christensen and Montgomery, 1996).

2.9.4.4 TAFFLER'S Z-SCORE PERFORMANCE ANALYSIS

The exact definition of Taffler's Z- score according to is not publishes (Elliott and Elliott, 2006).

The Taffler's Z-Score has the following components.

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \text{ where:}$$

X_1 = Returns on Current Assets \Rightarrow profit before tax / Current Assets.

X_2 = Current Ratio \Rightarrow Current Assets / Current Liabilities.

X_3 = Current liability per unit of Asset \Rightarrow Current liabilities / Total Assets.

X_4 = No credit interval \Rightarrow The length of time for which the company can continue to finance its basic from its assets without revenue inflow.

β_0 to β_4 represent the coefficient (Taffler, R. J. ,1991)

As the rule of thumb, with the bench mark of 0.2 for average performance, companies that score above 0.2 have high performance level and vice versa.

2.9.4.5 PAS SCORE PERFORMANCE ANALYSIS

In order to encourage inter organisational performance comparison, Taffler modified the ZScore to developed the PAS- Score by integrating variables to take care of changes in the economy (Elliott and Elliott 2006).

This score ranks all companies' Z-Score in percentiles to measure relative performance on a scale of from zero to hundred. (0 to 100).

As a rule of thumb, a PAS score of ' K %' means that when deducted the 'K'- percentage value from a hundred (100-K%) implies the number of companies that have higher Z-score than 'Z – K%' have good performance (Taffler 1991) this again shows the relative importance trend of a company over time (Holmes and Dunham, 1994).

2.9.4.6 H-SCORE

The H-Score which is an improvement on the Z-Score method is produced by an independent reputable organisation called Company Watch, and it is used to determine the overall financial health based on the strength of the balance sheet. (Elliott and Elliott, 2006).

In the computation of the H-Score the Company Watch uses seven factor information on profit asset (current asset cover, stock and debtors management and liquidity), and liability (equity base, debt dependence and current funding) from organisations' published financial statements.

As a rule of thumb the company arranges the results from zero (0) to a hundred (100) and all the organisations placed below 25 are classified as non-performing organisations.

The main advantage of this measure is that it can be applied to all other sectors and also the H-Score can be used to show how exactly to sort a company in crisis out of its problem.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

This chapter primarily outlines the methodology used to gather data to evaluate and analyze the impact of information technology investment on financial performance of commercial banks in Ghana.

It also outlines the research design, sample size, sampling techniques, data collection procedure and instruments used and above all the chapter looked at the mode of presentation and analysis.

3.1 THE SAMPLED COMMERCIAL BANKS

The 21st century global technological innovations have drastically changed the structure of commercial banking in Ghana. Maintaining almost the basic traditional functions of the

commercial banks, the mode and channels via which customers access financial products and services are constantly changing (Abor, 2004). Information Technology products and services such as Internet banking, Automated Teller Machines (ATMs), Mobile banking, “Mobile money”, Closed-Circuit television, etc and other related technologies are aiding the commercial banks to serve their clients in more convenient and cost effective ways. Clients now have total control over their banking at their convenience,-access to account balance, fund transfer, payment of bills, purchasing of goods can be done ubiquitous online (Frei et al., 1998)- while the banks grow their profits and improve on their productivity and competitiveness. (Rose, 1999; Hinson et al.,2006; Asante et al., 2011).

The CAL Bank:

The CAL bank in keeping up to the demands on today’s commercial banking needs to increase its market share and to satisfy clients has invested in a wide range of innovative ebanking products and services that enable clients to transact on their accounts without being present at the branch.

These products and services include ***CALNet, CAL e-Alert, ATMs, Debit Cards, SMS banking, E-zwich, CAL Cedi A Day, Live Chat Social media banking, etc***

The ***CALNet***, which is one of the internet-banking products, enable clients to manage their accounts from any location. They can, among other things download account statements, set standing order, request for banker’s draft, chequebooks, block cheques and make payments from their accounts.

The **CAL e-Alert** is a system that triggers SMS or E-mail notification to clients whenever a transaction hits their account. This help to updates clients on their accounts to enable them take timely decisions on their accounts.

Investment in **ATMs** has been superb, the bank has over one hundred networked ATMs machines that enable the bank's clients to do business from any branch of their choice. The ATMs are configured to assist clients in bills payment, funds transfer, purchase of mobile phone airtime vouchers, cash withdrawals as well as the Cash-In ATMs to enable clients to deposit funds into their account in multiples of hundred notes without visiting the banking halls.

Apart from the above innovated IT products and services, the CAL bank in addition issues highly secured Chip and PIN debit card for various transactions. They support the national cashless project by performing Ezwich allied services.

The bank is again helping those in the informal sector to save via their "**CAL Cedi A Day**" where clients through MTN mobile money can save a minimum of One cedi a day from their online wallet. A client only needs to dial *565*6*2# to get the service activated on his phone.

The Societe Generale.

In the quest to serve clients better to increase profit in the face of competition, the societe Geerale has invested in a wide range of innovative e-banking products and services that enable clients to transact on their accounts with ease.

The products and services include ***Sikanet, Sikatel, Sikatex, Express Card, Gold Card ATMs, E-zwich,***

The ***Sikanet*** is an online banking that provides clients with all the benefits of doing ones banking activities at the comfort of home or office. This facility also enables clients to check account balance, transfer funds to any bank, set up and mange standing order, send and receive messages to and from the bank, request for chequebooks and above all, through a loan simulator can determine how much one can borrow in any point in time.

The **Sikatex** is an SMS alert system. Like the **CAL e-Alert**, the system that triggers SMS or E-mail notification to clients whenever a transaction hits their account. This help to updates clients on their accounts to enable them take timely decisions on their accounts

The **Sikatel** is automated and interactive telephone banking. The service enables clients to perform banking transactions from any location.

Through the Sikatel, choose between English language and Twi to carry out banking business. They can block stolen cards or cheques, access accounts 24/7, find out branches location of the bank or even connect to agents to get assistance.

The bank has also invested in ATMs, E-zwich, express cards and Gold cards.

The express card is a Chip based VISA debit card with a PIN use on all VISA branded ATMs anywhere in the country.

The Gold cards are chip based VISA card used outside domicile. The cards are linked to clients accounts can withdraw from both the bank's ATMs and VISA branded ATMs and can be used for online shopping and other online transactions.

It is vital to note that holders of such cards enjoys free medical insurance upto 30,000 Euros on all travels within and outside the country as well as free legal services.

The UT bank

The UT like the other commercial banks has invested in e-banking products to enhance clients interaction and comfort.

The e-product from the banks are the ***iBank, Tranz-Alert, fonBanking, U-link Card, VISA cards and ATMs.***

The **iBank** is an internet banking, which like similar products from other competitors offers clients access to their accounts 24/7 for monitoring. The facility help clients to pay bills such as ADSL Broadband, ECG bill, DStv, Top ups phone airtime, set up and manage standing orders, view and print account statements, funds transfers and request for other e-products.

Corporate clients also use the facility to pay salaries to their workers.

The Tranz-Alert is similar to the **Sikatex** and the **CAL e-Alert**, the system that triggers SMS or E-mail notification to clients whenever a transaction hits their account to updates clients on their accounts.

The **fonBanking** is a telephone banking system where customers can call to inquire about products, lodge complaints, request chequebook or account statements, etc.

The **U-Link Card** is a UT bank branded card that enable holders to access 24/7 UT ATMs to withdraw cash, request for chequebooks, account statements and transfer funds within ones accounts. It is vital to note that the GH-link platform, holders of U-Link cards can transact business from over one thousand on the platform irrespective of the bank, which owns the terminal.

The UT bank offers varied types of VISA cards. They have the regular VISA debit card use in the same way as all the other commercial banks that is linked to the client account. In addition the bank offers prepaid VISA cards such as the general purpose prepaid cards, the VISA Youth prepaid Cards and the VISA Gift Prepaid Cards. These cards are not linked to any prior bank account. The amount requested by the client is loaded onto the card for use.

These cards can be used for online payments, international transactions, payments at all VISA point of Sale merchants nationwide and withdrawals from all branded VISA ATMs terminals.

The Standard Chartered Bank

The standard chartered bank Ghana has invested in varied information technology products to guarantee its valued customers the best of service. Among the e-products are the online banking, phone banking, mobile banking, standard chartered mobile breeze, e-statement, ATMs, credit and Debit card, call centre, VISA Gold card etc.

The standard chartered mobile breeze is an online facility that enables clients to move funds between banks and between Standard Chartered accounts, make credit card payments, pay utility bills, top up airtimes, makes local and international telegraphic transfers among others. The other services are not different from the services of the other commercial banks eproducts.

Eco bank

The bank offers a wide range of products that are tailored to suit their clients financial and banking needs.

The bank offers debit card, SMS- Alert, e-Alerts, e-Statements, internet banking, etc.

By the e-Statement, clients are sent e-mails to help them fully appraised the activities on their account over the period they request while the e-Alert sends SMS and e-mails to clients on every happening in the form of transactions that may hit their accounts.

The SMS banking service allows clients to access their account wherever they are. This same facility allows them to request for account balance and statements, view the last three transactions on ones accounts via SMS. Their internet banking solution is not different from the earlier commercial banks discussed in principles and basic facilities. However, in addition, it covers all the Eco banks networks in 81 countries in west and Central Africa making it possible for corporate clients operating in more than one country in the region to be able to access their various accounts at any Ecobank affiliate regardless of the country or currency.

The mobile money enables clients to transfer funds, buy airtime, make payments and collects money via electronic wallets created on their mobile phones.

3.2 DATA TYPE AND SOURCES

The data used for the study was mainly secondary extracted from final accounts and other annual reports of the selected commercial banks for all the relevant years from 2006 to 2014 under consideration. Additional information were obtained from reports of other reputable independent organisations and institutions such as Pricewaterhouse Coopers, Bank of Ghana, Association of Banker, etc and banks records.

3.3 DATA ANALYSIS MODEL SPECIFICATION

The study assessed the impact of information technology investment on profit of commercial banks in Ghana using regression analysis and financial ratios analysis.

Financial ratios were used to assess financial performance while the regression analysis was used to assess the relationship, impact, and significance of the choice variables.

The models consist of two main categories of variables, thus the Response variables and the stimulus variables. The response variables are the Profit before Tax and deposit. Whilst the stimulus variables are Loans, Bank of Ghana prime rate, Deposits by customers of the commercial banks and Expenditure on information technology (IT). The regression models for this study are therefore stated as follows;

$$Profit_{it} = \beta_0 + \beta_1 ITexp_{it} + \varepsilon_{it} \dots \dots \dots 1$$

$$Profit_{it} = \beta_0 + \beta_1 bogpr_{it} \dots \dots \dots 2$$

$$Deposit_{it} = \beta_0 + \beta_1 ITexp_{it} \dots \dots \dots 3$$

$$Profit_{it} = \beta_0 + \beta_1 ITexp_{it} + \beta_2 bogpr_{it} + \beta_3 loan_{it} + \beta_4 Deposit_{it} + \varepsilon_{it} \dots \dots 4$$

Where:

Profit = Profit before tax of commercial banks IT

exp = Expenditure on IT investment on Software

bogpr = Bank of Ghana Prime Rate loan = Loans
to customers

Deposits = Total deposits made by customers of commercial banks during the years under consideration. β_0 to β_4 are the coefficients which shows the impact of the variables in the model.

From the below;

- **Equation -----1** calculates the impact and correlation of IT expenditure on profit of the commercial banks.
- **Equation -----2** assess the impact and correlation of Bank of Ghana prime rate on profit of the commercial banks.
- **Equation -----3** computes the impact and correlation of IT expenditure on deposit of the commercial banks.
- While the **equation----4** which is the main models, evaluates the combined impact of all the choice variables on the business profit .

The subscript i and t represent the cross-sectional and time series dimension of the data respectively.

3.4 MEASUREMENT OF VARIABLES

The variables used for the study are Return On Asset (ROA) Return On Equity (ROE), Profit before Tax, Earnings per Share, Total Loans given by the various banks, Deposit mobilised by the banks, Bank of Ghana prime Rate and Expenditure by the banks on Information Technology related products.

- $$ROA = \frac{\text{Net Income}}{\text{Total Assets}}$$

- $$ROE = \frac{\text{Net Income}}{\text{Shareholder's equity}}$$

- Profit before Tax = Total Revenue – Total Expenses

Total Revenue includes both revenue and non Interest revenue.

Total Tax include Total operating Expenses plus Interest expenses excluding corporate Tax

It is important to note that all others were obtained from the banks but not computed by the researcher.

The rationale for the chosen variables are due to the fact that some of them have been used in related works and more importantly those variables have some perceived relationship to profits of organisations.

For instance, return on assets has been used in measuring the overall performance of organisations since time immemorial (Ahmed and Khababa, 1999).

Profit before tax has also been used to measure the net benefit accumulated by banks in a year (Akintoye, 2004; Rose and Hudgins, 2006)

3.5 DEFINITIONS OF VARIABLES

The variables employed in the study are described as follows;

3.5.1 Bank of Ghana Prime Rate (bogpr)

The prime rate refers to the rate of interest, which the central bank charges on loans to the commercial banks. It can as well be referred to as the rate at which the central bank is prepared to discount the first class bills of the commercial banks.

The Bank of Ghana price rate has a strong positive correlation with the lending rate of the commercial banks, even though sometime the commercial banks hold on to their existing base

rates independent of the Prime rate changes especially when overnight interbank lending rate is favourable and more so other factors such as cost of funds, cost of intermediation, cost of losing depositors funds and riskless margins are well catered for.

However, the influence of the Bank of Ghana prime rate is always strong in the long term. This then means that whenever the prime rate increases since the commercial banks profits usually depends on the difference between the prime rate and their lending rate they also increase the lending rate to ensure profit. The management of the commercial banks investment portfolio may make the relation otherwise.

3.5.2 Loan to customers

This refers to the amount of money the commercial banks give to their customer. This amount is to be paid back to the bank at a stipulated time with interest. Profit of the commercial banks depends on the percentage of “performing” loans. When the banks give loans and through effective monitoring, they are able to reduce the size of non-performing loan, then the loan will have positive influence on the overall profit.

3.5.3 Profit Before Tax

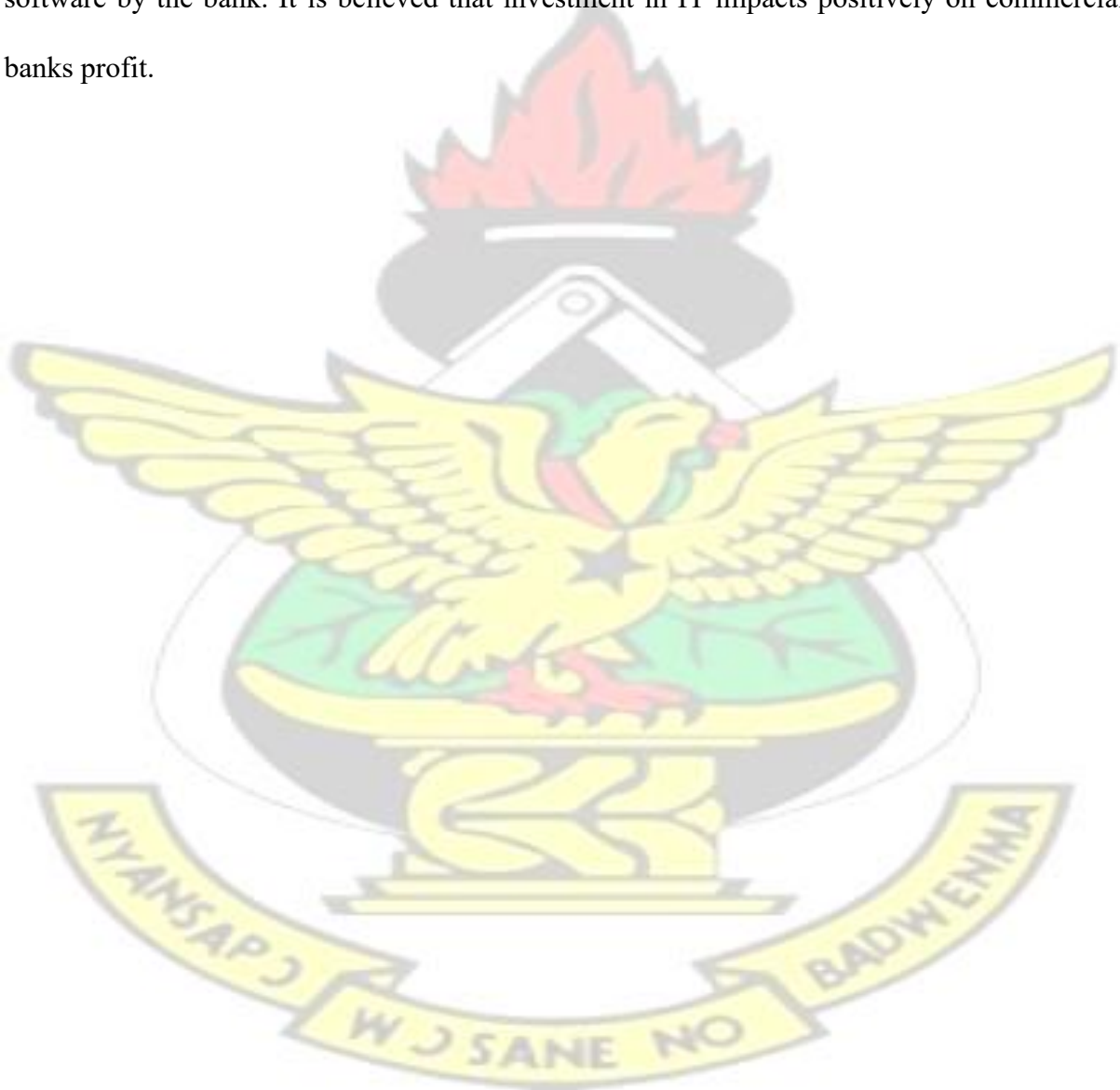
Profit before tax of commercial banks is one of the key performance indicators which most stakeholders used to assess organisation performance. It is the excess of total income over the sum of impairment charges and operating expenses.

3.5.4 Deposits

Total deposits made by all category of customers of commercial banks during the years under consideration. Deposit forms the main base of the amount the commercial banks give out as loans to the public. This then means that if the commercial banks are able to mobilise more deposit and effectively channel that into performing loans, then the deposits will have a direct positive effect on their profit.

3.5. 5 IT expenditure

Is made up of expenditure on software and hardware, but for the purpose of this study, the IT expenditure is restricted to the expenditure on IT software. This is because most of the commercial banks do expense hardware expenditure and data on it do not appear on their published account, which forms the main source of data for the study. The IT expenditure here is made up of the amount used to purchase software as well as the amount spent in developing software by the bank. It is believed that investment in IT impacts positively on commercial banks profit.



CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.0 INTRODUCTION

The chapter looked at the generated model, presentation of results, analysis and discussion of results from the model as well as the secondary data extracted from the financial statements of the banks and other reports. The analysis and discussions were presented in two parts.

The first part looked at the data relating to the financial performance appraisal of the selected commercial banks using the trends of the performance indicators, notably the profit, earnings per share, return on asset, return on equity of the banks.

The second part presented the descriptive statistics, the correlation between the regressors and the regressands base on the estimated regression models, their consequences and economic implications on the activities of the commercial banks in particular and the economy of Ghana as a whole.

4.1 TREND ANALYSIS OF PROFITABILITY INDICATORS

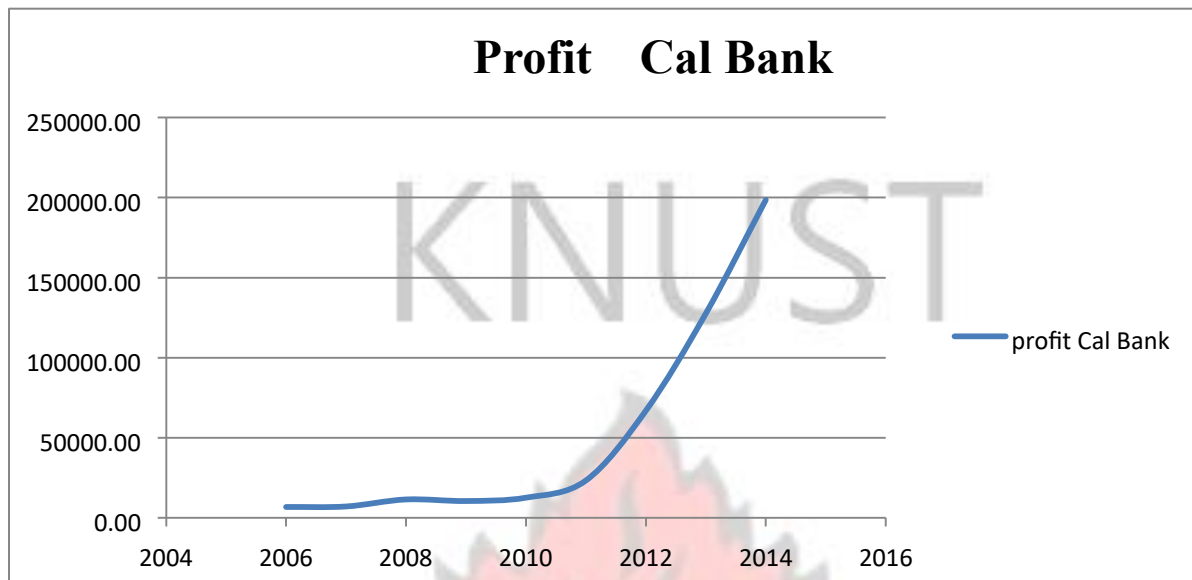
This section presents the analysis of trend results of the various profitability indicators of the selected banks in graphs to show their profit situations. The profitability indicators used are profit before tax, earnings per share, returns on asset and return on equity.

It must be emphasized that, the trends of profitability indicators were analyzed based on their movements as graphed from the banks' financial statements.

Below are the profits as well as other profitability indicators of each of the banks presented graphically to help in the trend analysis.

The profits of the banks presented in graphs are as follows:

FIGURE 4.1 THE PROFIT OF CAL BANK GHANA LIMITED

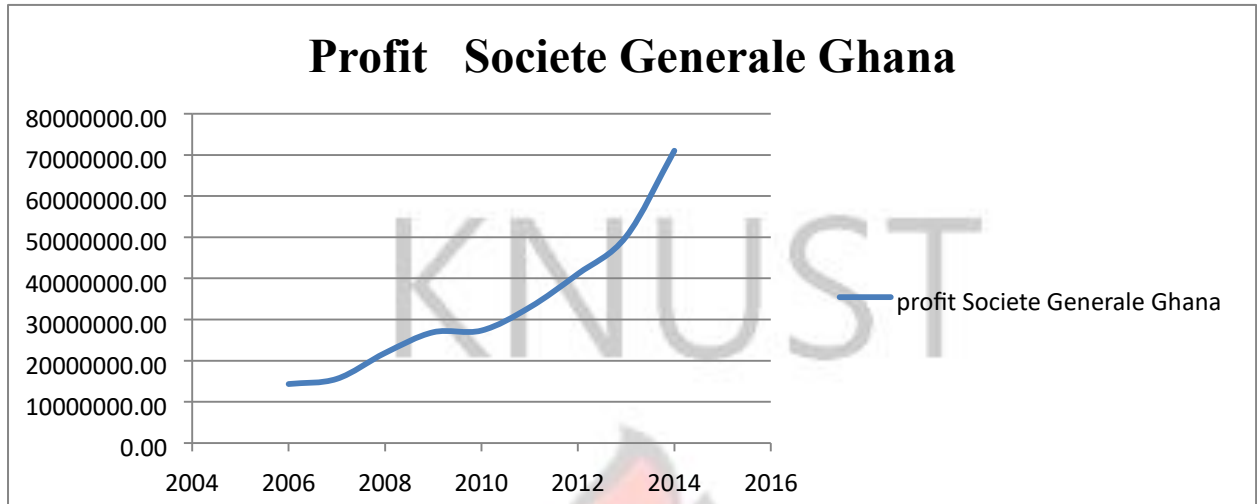


(Source Author's own)

From the above it was found out that between 2006 and 2010 the bank put in several measures to position itself for a giant leap which saw an appreciable increased in the profit of the bank 2011 onwards. Among the reasons for the astronomical rise in the profit was the strengthening of the banks market intelligence, deepening of relationship with customers, adding to customer base, introduction innovative programs and products which increased deposit.

Improvement in risk management capabilities, reduction in non-performing loans, diversification of portfolios, automation of customer services and enhancement of delivery channels were some of the reasons given by management.

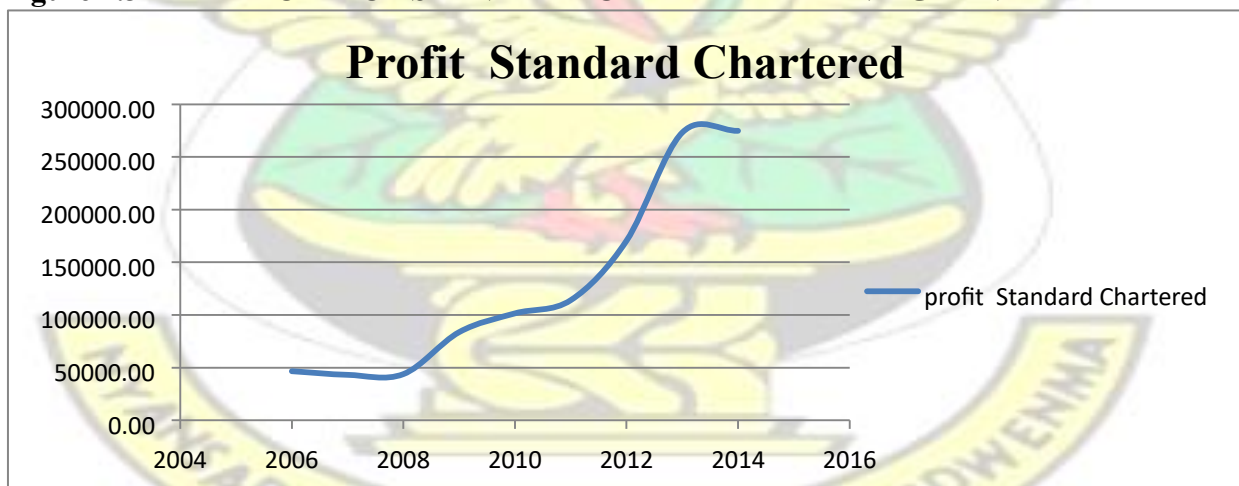
FIGURE 4.2 THE PROFIT OF SOCIETE GENERALE BANK GHANA LIMITED



(Source Author's own)

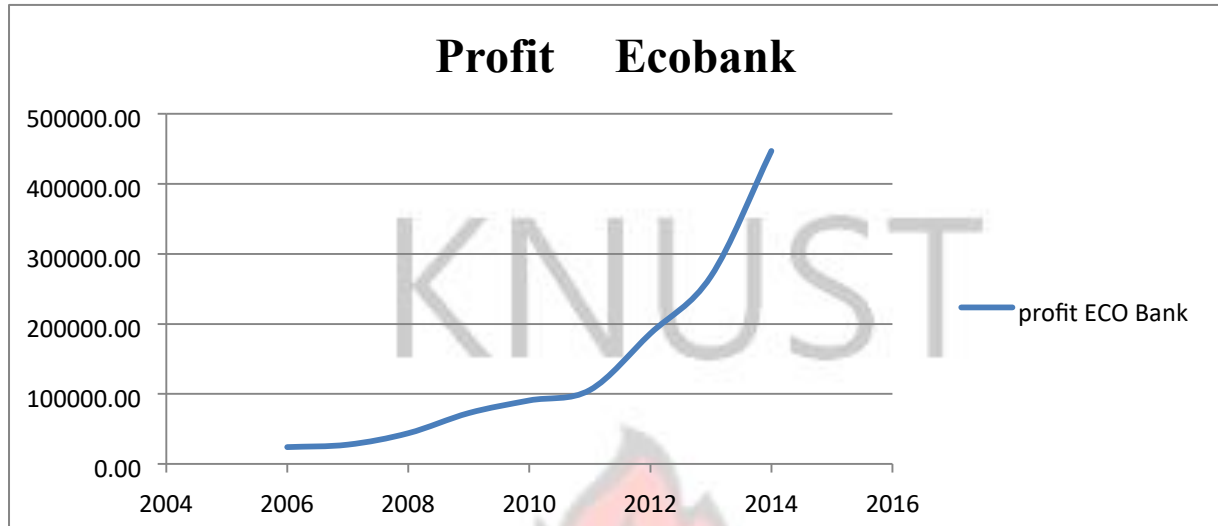
The profit of over the study period showed an average increased. Management explained that the bank was positioned to take advantage of the opportunities in the industry. They maintained that prudent measures along financial discipline also contributed to the success story.

Figure 4.3 THE PROFIT OF STANDARD CHARTERED BANK GHANA LIMITED



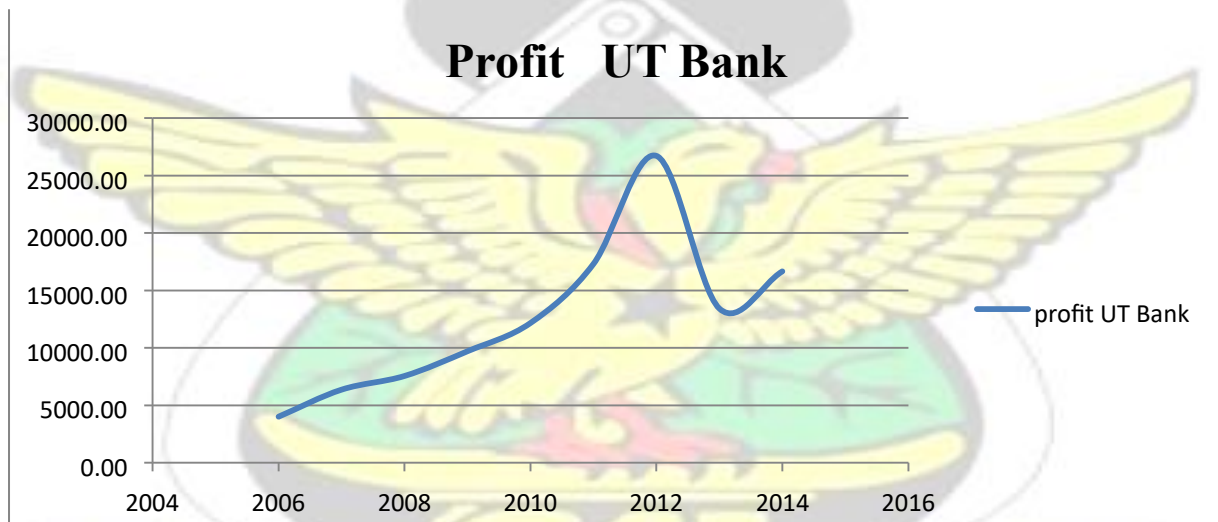
(Source Author's own)

FIGURE 4.4 THE PROFIT OF ECOBANK GHANA LIMITED



(Source Author's own)

FIGURE 4.5 THE PROFIT OF UT BANK GHANA LIMITED



(Source Author's own)

From figures 4.1 to 4.4, the profits for those banks had consistent and appreciable average increase within the study period. Even though a casual look shows that the increased for each of the banks has not been continuously smooth due to the fluctuations in some exogenous economic variables notably the rate of inflation, Gross Domestic Product, capitalisation, etc within the study period which affected the banks' ability to make continuous profit. The graphs

showing the profits of Cal Bank, Ecobank, Societe Generale Ghana and Standard Chartered were almost a smooth rise.

However, the profit of UT bank rose from 2006 through to five months after 2012 due to several factors chiefly were prudent investments and remodelling of the core banking software within the period.

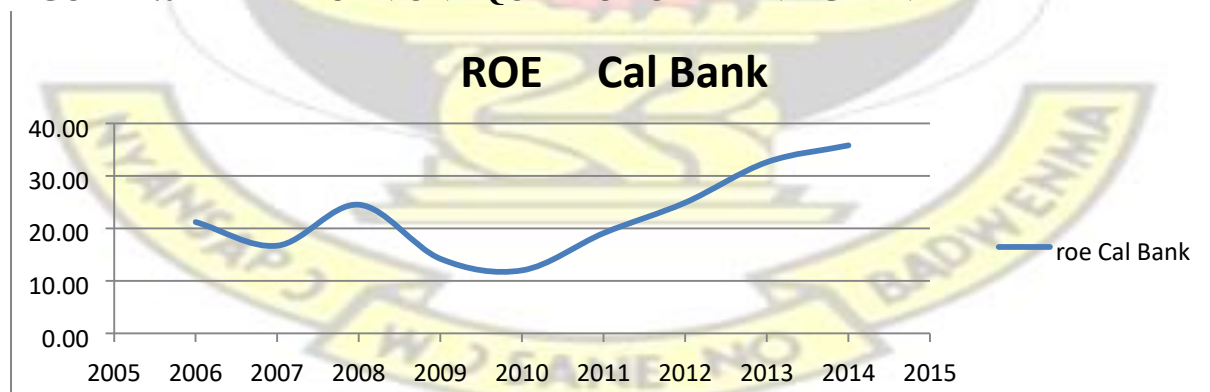
Unfortunately, profit dropped sharply till first quarter of year of 2013 and then picked to rise again.

The management explained causes to be the results of the adverse global economic condition especially the Euro zone debt crisis, financial pressures and the unusual upward volatility in the foreign exchange market that posed challenge to the Less Developed Countries, apart from that they stated a fall in commission and fees from trade finance and net interest income. Aside the numerous post merger challenges.

Below are the graphs of Return on Equity (ROE) of the banks to help in the trend analysis.

The Return on Equity (ROE) of the banks presented in graphs are as follows:

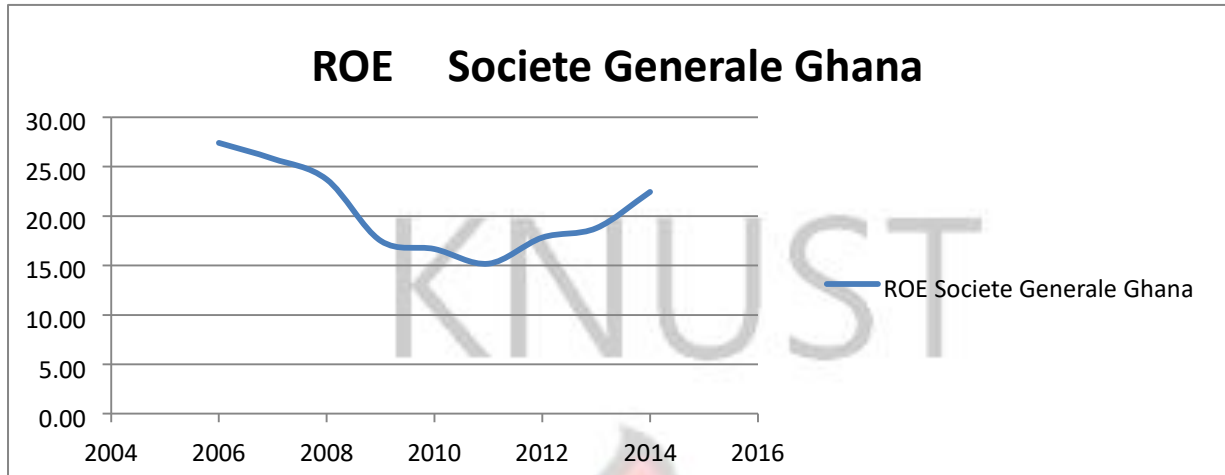
FIGURE 4.6 THE RETURN ON EQUITY OF CAL BANK GHANA LIMITED



(Source Author's own)

FIGURE 4.7 THE RETURN ON EQUITY OF SOCIETE GENERALE BANK

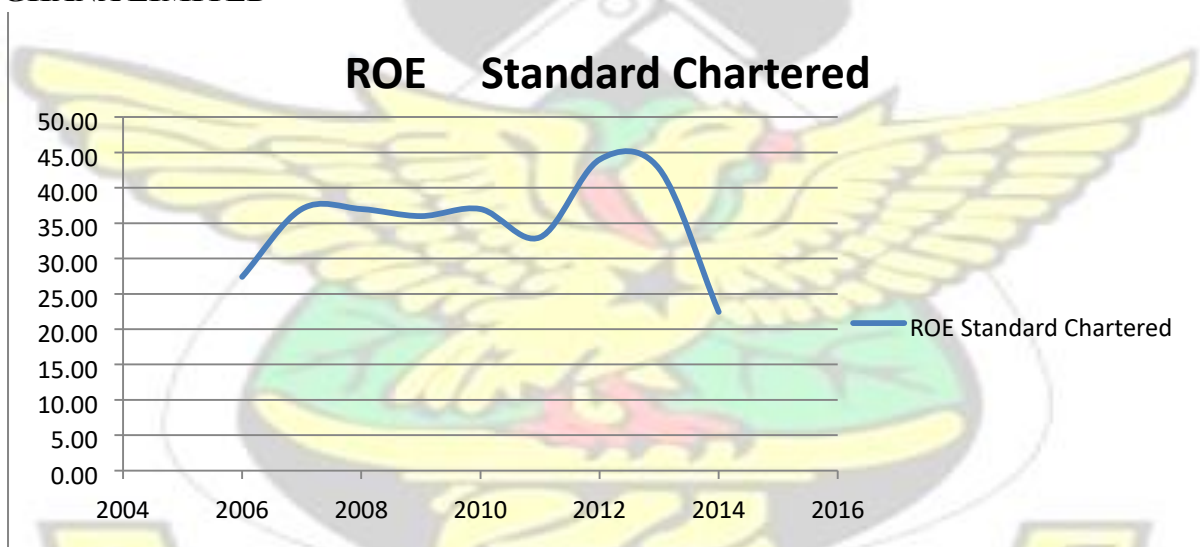
GHANA LIMITED



(Source Author's own)

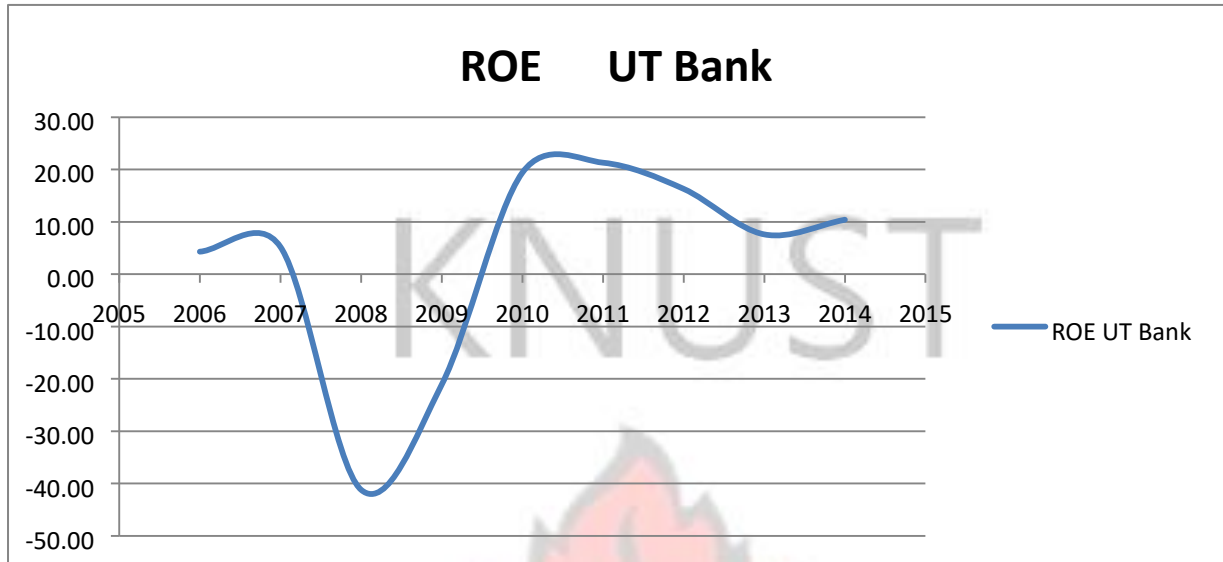
FIGURE 4.8 THE RETURN ON EQUITY OF STANDARD CHARTERED BANK

GHANA LIMITED



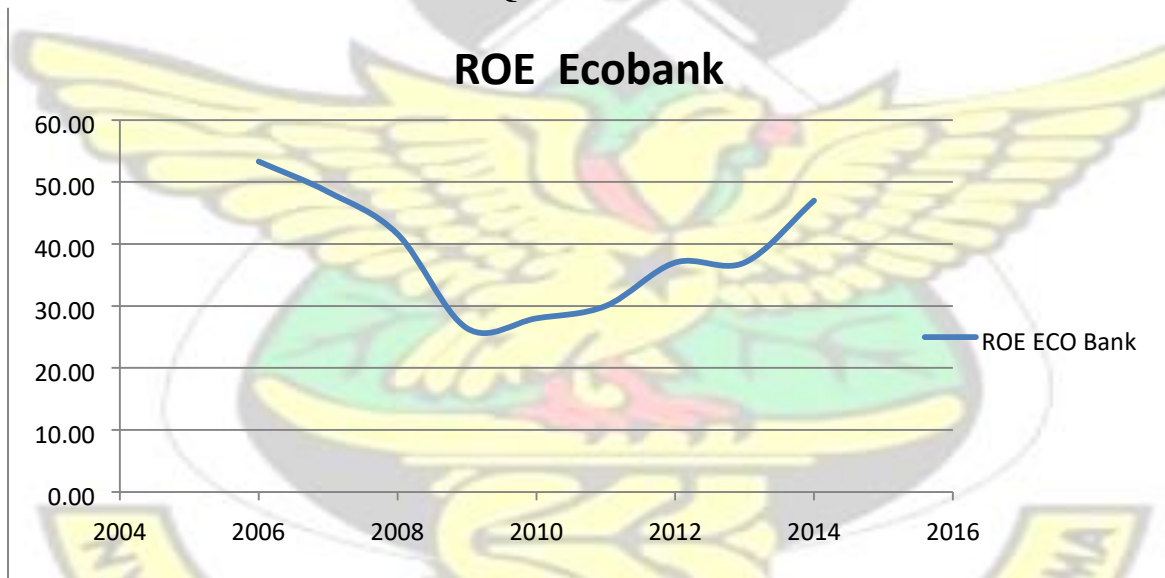
(Source Author's own)

FIGURE 4.9 THE RETURN ON EQUITY OF UT BANK GHANA LIMITED



(Source Author's own)

FIGURE 4.10 THE RETURN ON EQUITY OF ECOBANK BANK GHANA LIMITED



(Source Author's own)

Figures 4.6 to 4.10 are the graphs of the return on equity.

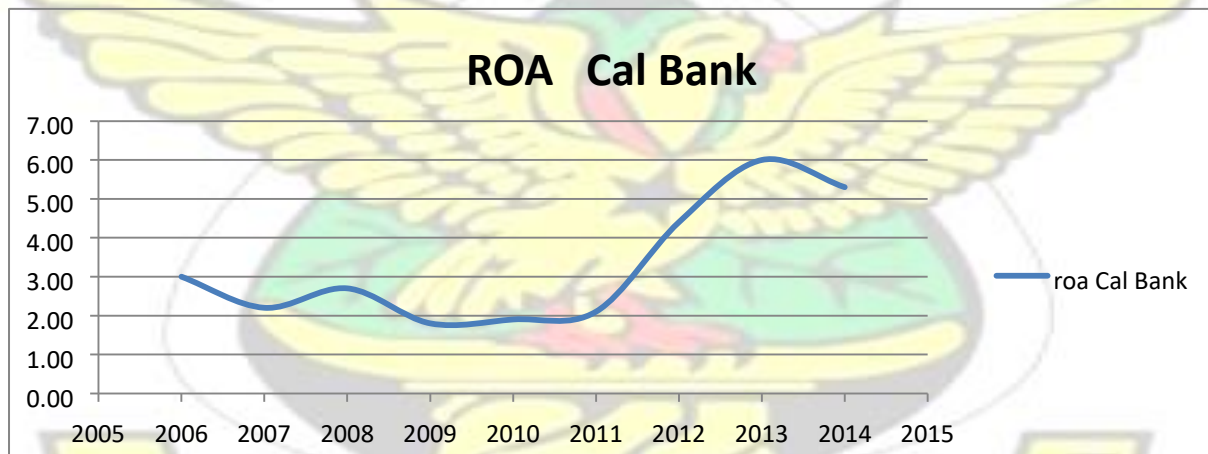
The graphs show that all of the various banks had near average increased within the study period. However, in 2006 only Ecobank outperformed the market with an ROE of 53.3% .

The UT bank has a ROE of 4.3% which was far too below that of the banking industry's average of 28.4%. (See Appendix A)

Reasons that accounted for the inability of most of the banks' to perform creditably within the study period were the fall in interest rate which reduced the banks' opportunity to make high profit coupled with the drastic fall in Treasury bill rate (2008 & 2009) which significantly changed retained profit in the face of increased in cost, since the ROE is made up of net spread, cost efficiency and leverage as reported by Pricewaterhoused Coopers in association with the Ghana Association of bankers in .

Below are the graphs of Return on Asset (ROA) of the banks to help in the trend analysis The ROA of the banks presented in graphs are as follows:

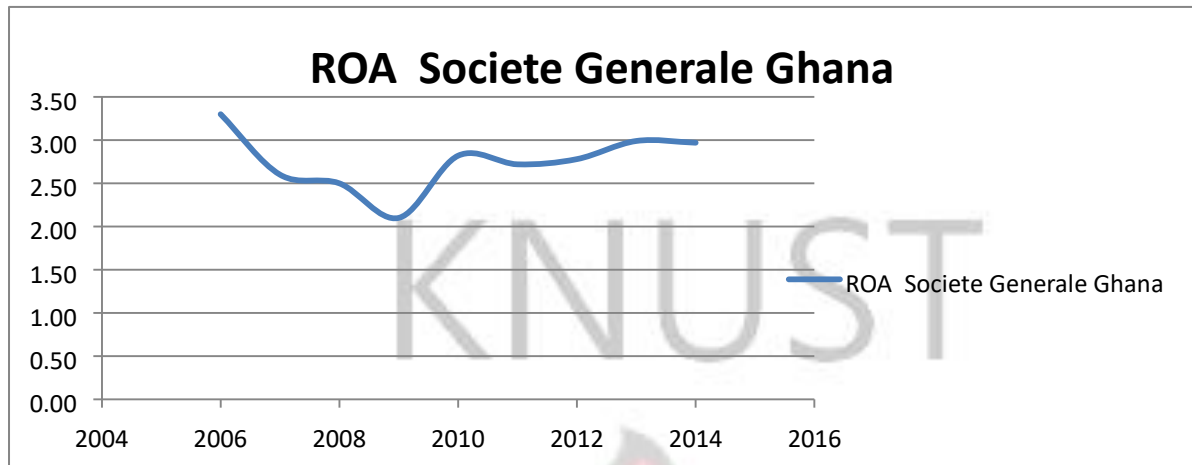
FIGURE 4.11 THE RETURN ON ASSET OF CAL BANK GHANA LIMITED



(Source Author's own)

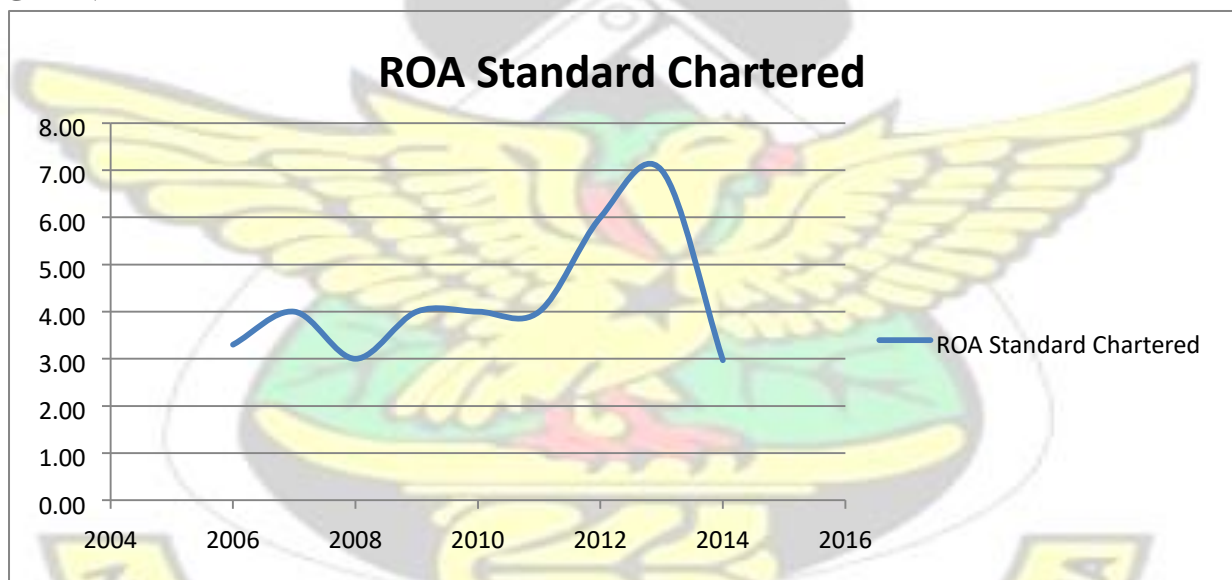
FIGURE 4.12 THE RETURN ON ASSET OF SOCIETE GENERALE BANK GHANA

LIMITED



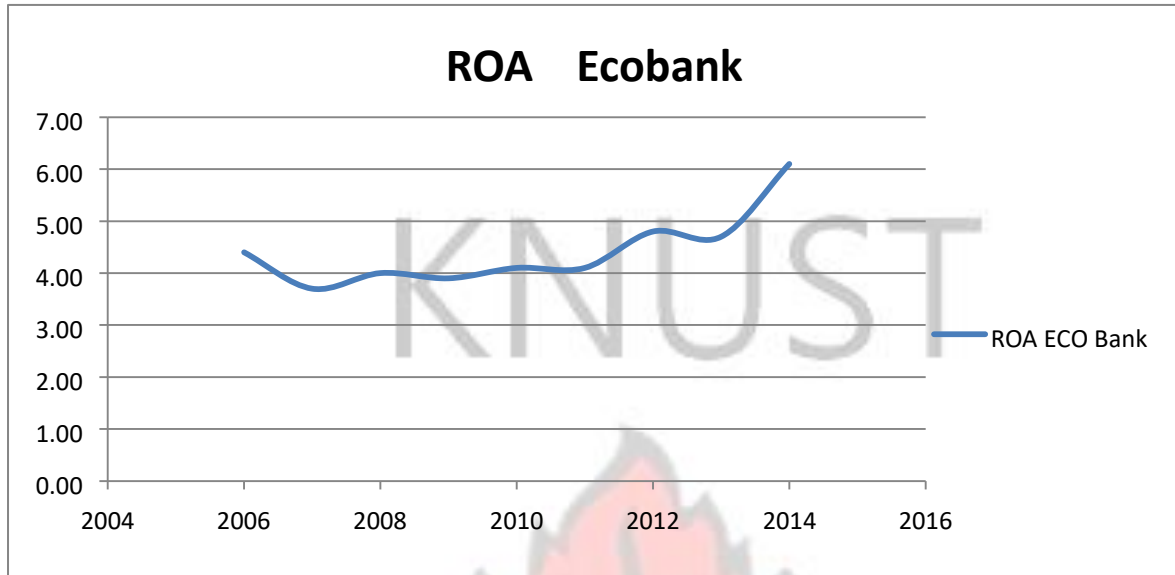
(Source Author's own)

FIGURE 4.13 THE RETURN ON ASSET OF STANDARD CHARTERED BANK GHANA LIMITED



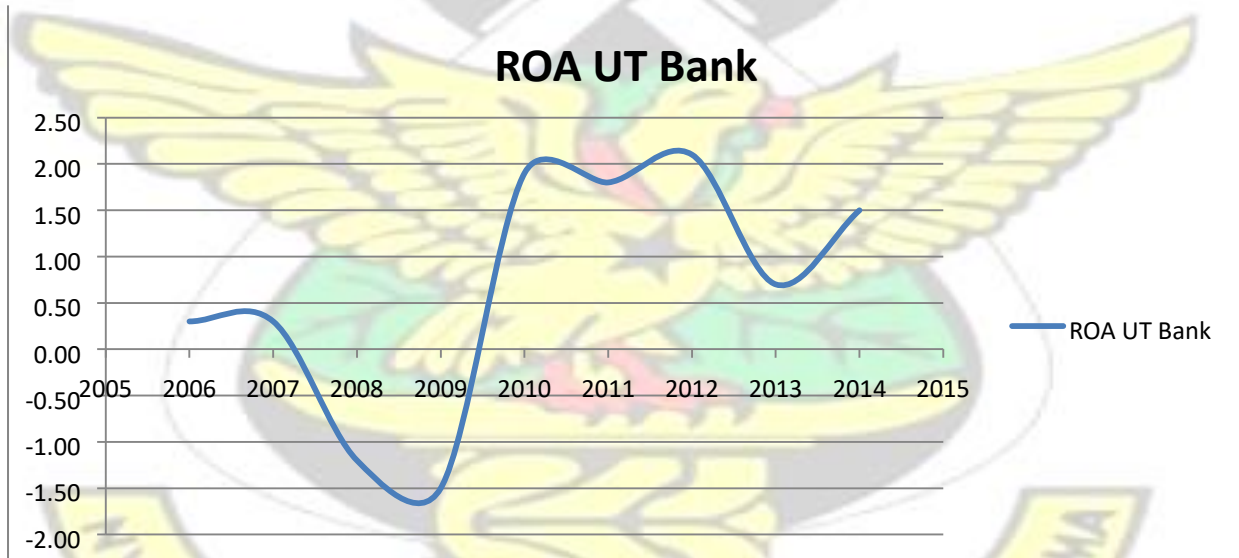
(Source Author's own)

FIGURE 4.14 THE RETURN ON ASSET OF ECOBANK GHANA LIMITED



(Source Author's own)

FIGURE 4.15 THE RETURN ON ASSET OF UT BANK GHANA LIMITED



(Source Author's own)

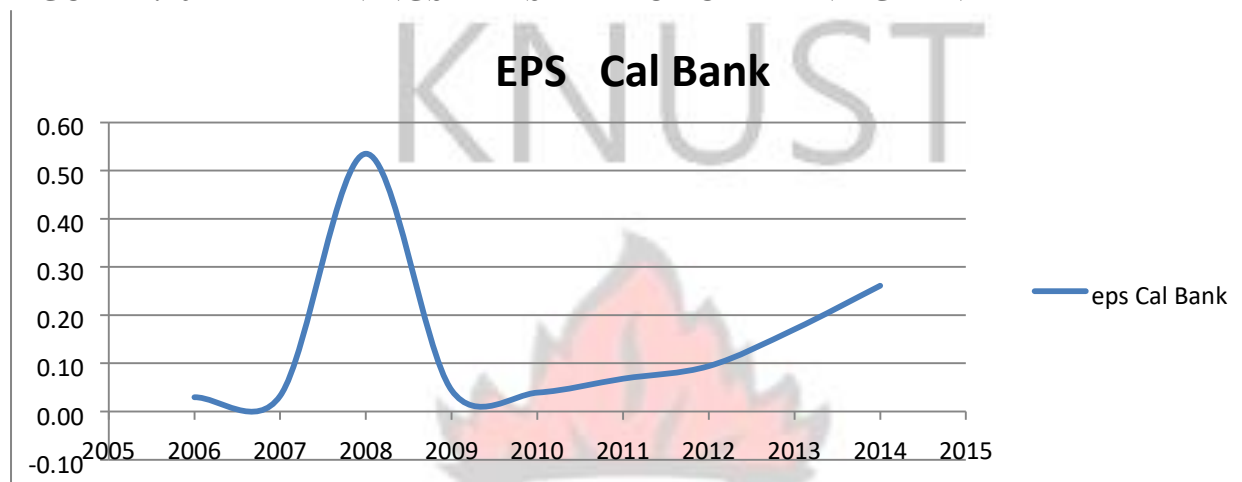
Figures 4.11 to 4.15 are the return on assets graphs for the banks. The graphs show that all of the various respective banks had a near average increased from 2006-2014.

The fluctuations in them were mainly due to the fluctuation in the profits of the banks and deterioration in asset quality due to credit crisis which reduced acquisition of new assets.

Below are the graphs of Earnings Per Share (EPS) of the banks to help in the trend analysis.

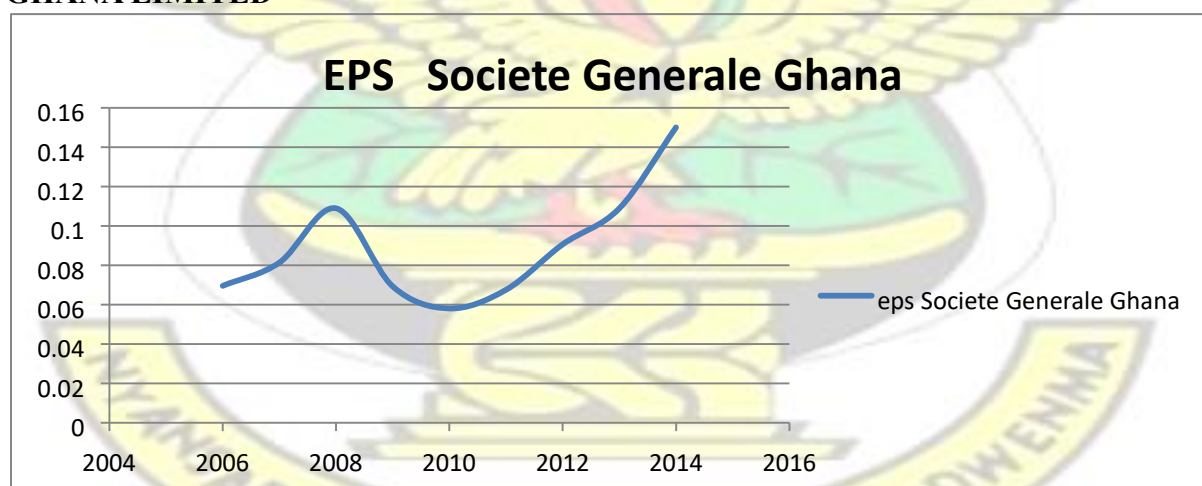
The Earnings Per Share (EPS) banks presented in graphs are as follows:

FIGURE 4.16 THE EARNINGS PER SHARE OF CAL BANK GHANA LIMITED



(Source Author's own)

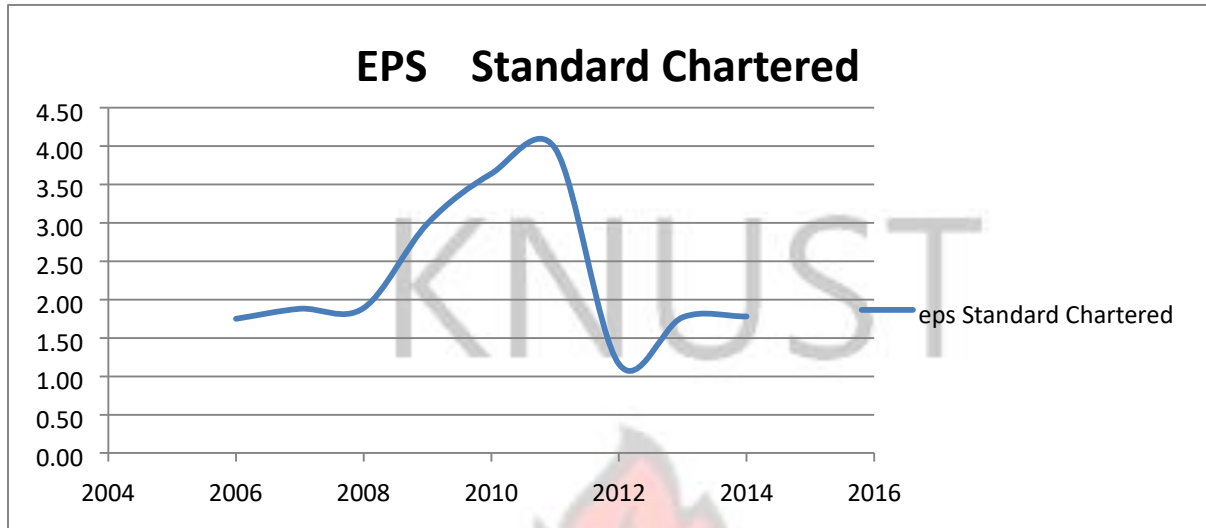
FIGURE 4.17 THE EARNINGS PER SHARE OF SOCIETE GENERALE BANK GHANA LIMITED



(Source Author's own)

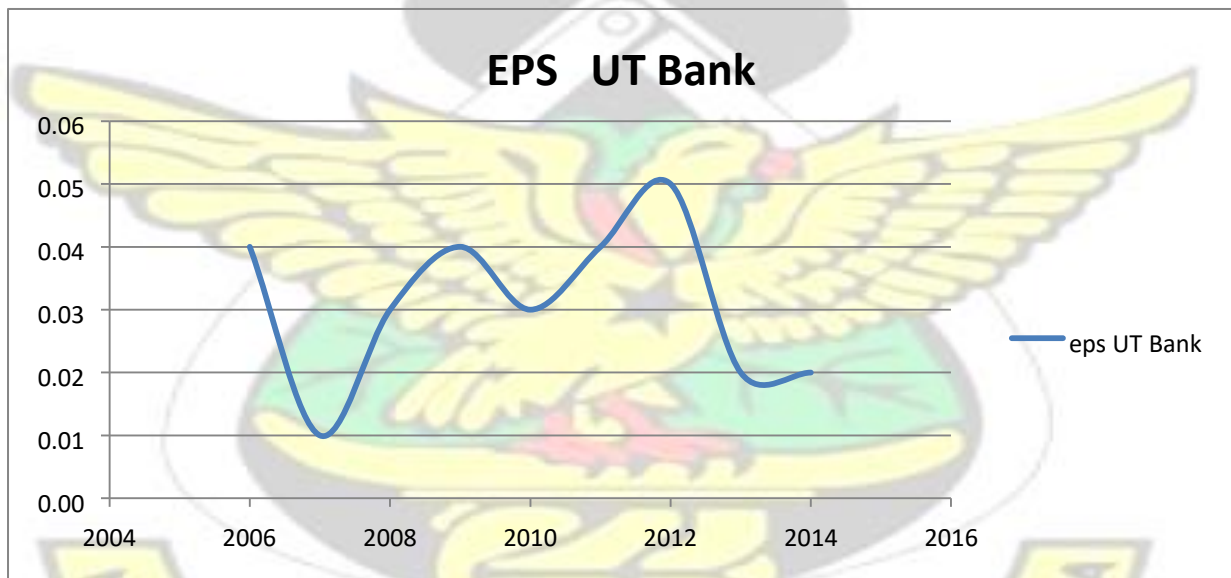
FIGURE 4.18 THE EARNINGS PER SHARE OF STANDARD CHARTERED BANK

GHANA LIMITED



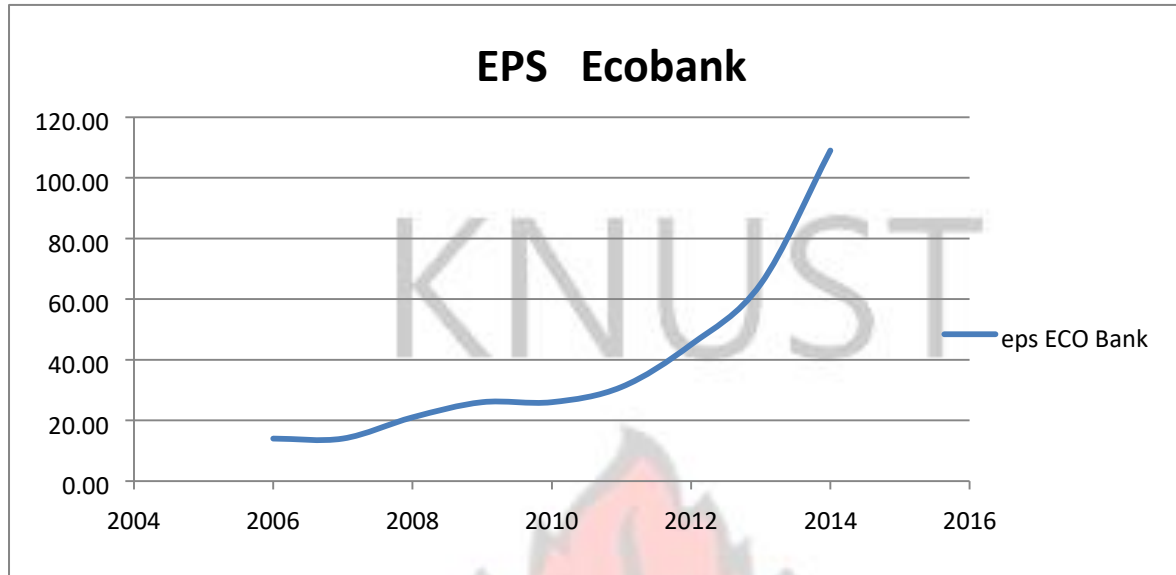
(Source Author's own)

FIGURE 4.19 THE EARNINGS PER SHARE OF UT BANK GHANA LIMITED



(Source Author's own)

FIGURE 4.20 THE EARNINGS PER SHARE OF ECOBANK GHANA LIMITED



(Source Author's own)

Figures 4.16 to 4.20 are the earnings per share graphs which showed a near average increased by the banks within the study period.

Apart from the UT banks which earnings per share from 2006-2008 declined even to negative, all the other banks have their earnings per share increased almost smooth. The inconsistencies in the earnings per share for the various banks was due to the fluctuation in profits in relation to the number of shares outstanding which was almost held constant.

In conclusion it is vital to note that when the profit and other profitability indicators were smoothened, they showed an average increase to signify that the banks used the study were on average performed creditably.

On the regression analysis, it is vital to note that, since panel data was used for analysis the data was first tested for validity and unit root. The Shapiro-Wilk W test was used to check for validity via of the error term as shown by Shapiro- Wilk W test Results (See Appendix B).

The Panel unit root tests and First Difference Test (Appendix D) confirmed the absence of unit root to allow for the use of the GLS model. The random effect which was confirmed by the Hausman test was used. The results is presented by The Hausman Test Results (See Appendix E)

4.2 DESCRIPTIVE STATISTICS

Descriptive statistics is employed to show in a summary the pattern and other significant relationships depicted by the data.

TABLE 4.1 THE SUMMARY STATISTICS

Variables		Mean	Standard Deviation	Minimum	Maximum	Observations
id	overall	3	1.430194	1	5	N = 45
	between		1.581139	1	5	n = 5
	within		0	3	3	T = 9
t	overall	5	2.611165	1	9	N = 45
	between		0	5	5	n = 5
	within		2.611165	1	9	T = 9
itexp	overall	363908.6	1123078	0	6331806	N = 45
	between		807277.5	871.4444	1808009	n = 5
	within		853286.8	-1166724	4887706	T = 9
profit	overall	6759919	1.56E+07	4007	7.10E+07	N = 45
	between		1.49E+07	12651.44	3.35E+07	n = 5
	within		7758898	-1.24E+07	4.43E+07	T = 9
deposit	overall	1.18E+08	2.72E+08	44826	1.13E+09	N = 45
	between		2.61E+08	440937.9	5.84E+08	n = 5
	within		1.36E+08	-2.30E+08	6.61E+08	T = 9
bogpr	overall	15.66667	2.840455	12.5	21	N = 45
	between		0	15.66667	15.66667	n = 5
	within		2.840455	12.5	21	T = 9
loan	overall	5.45E+08	5.54E+08	7520000	2.71E+09	N = 45
	between		2.78E+08	3.27E+08	9.87E+08	n = 5
	within		4.93E+08	-2.80E+08	2.27E+09	T = 9

u	overall	6759919	1.55E+07	-755317.4	6.47E+07	N = 45
	between		1.47E+07	-19095.13	3.31E+07	n = 5
	within		7816614	-1.35E+07	3.83E+07	T = 9

(Source Author's own)

The Table 4.1 shows the summary statistics of the variables. These descriptive statistics consist of the total Observations ($N = n \times T$), number of Banks used in the study (n), the number of years (T) each was observed.

In addition are the Mean, Standard Deviation, The Minimum and the Maximum of each of the variables.

The Mean value of the individual variables shows on the average the amount of money each commercial bank spends annually on each of the choice variables. For instance on the average each bank spends Gh¢ 363908.60, annually on Information Technology. It is vital to note that the between and within variation values as given by the standard deviation show how the expenditure on IT and other choice variables vary from one bank to the other on the average on yearly basis. The within values show the variations in the same bank in a period of one year when deflated by the overall mean.

4.3 REGRESSION ANALYSIS AND DISCUSSION

TABLE 4.2 IMPACT OF IT EXPENDITURE ON COMMERCIAL BANKS PROFIT

profit	Coefficient	Standard Error	Z	P > Z	95% [Conf. Interval]	
itexp	7.8379	1.744647	4.49	0.000	4.418456	11.25735
_cons	3907639	2038854	1.92	0.055	-88440.1	7903719
Sigma_u	0					
Sigma_e	8241210					
Rho	0	(fraction of variance due to u_i)				

(Source: Author's own)

The Table 4.2 presents the results of the impact of IT expenditure on commercial banks' profit. The results at 5% (two-tail test) level of significance shows that IT expenditure is significant at one-sample test as shown by the (P-Value = 0.000). This means that IT expenditure has significant impact on profit.

Also with the coefficient being positive and the magnitude of 7.8379, means, whenever the bank increased IT expenditure by one point unit, the profit will increased by 7.8379 point units.

This assertion makes business and economics sense. It is on record (Hammer, 1990; Hammer and Champy, 1993) that IT expenditure induced efficiency in business process reengineering that promotes rethinking and redesigned of business processes to create innovative products, which increased profit.

Again, IT is an enabler of dynamic capability of firms that improves business process performance to grow (Bharadwaj, 2000; Peteraf and Barney, 2003). The grown in profit usually result from reduction in cost of operation, improvement in product quality, speed in service delivery.

It makes the banks concerned much stronger and more successful competitor in the marketplace.(Daniel, D., Joseph, M.F and Thomas, A. 2014)

Furthermore, the IT expenditure goes a long to create new and efficient electronic banking products such as deposit machines, Automated Teller Machine (ATM), debit and credit cards, telephone banking, digital television, internet banking, mobile banking etc, (Ovia, 2001) to satisfied consumers' needs thereby increased the banks profit.

Finally, the positive coefficient also implies the bank can still make much profit with further IT investment. This is shown by the positive coefficient of the IT expenditure of 7.8379.

TABLE 4.3 IMPACT OF BANK OF GHANA PRIME RATE ON COMMERCIAL BANKS PROFIT

profit	Coefficient	Standard Error	Z	P > Z	[95% Conf. Interval]	
bogpr	909236.8	412458.5	2.20	0.027	100832.9	1717641
_cons	-7484790	9291632	-0.81	0.421	-2.57E+07	1.07E+07
Sigma_u	14703206					
Sigma_e	7771313.7					
Rho	0.78164059	(fraction of variance due to u_i)				

(Source Author's own)

The Table 4.3 presents the results of impact of Bank of Ghana Prime Rate on commercial banks' profit. The results at 5% (two-tail test) level of significance shows that the Bank of Ghana Prime Rate is significant at one-sample test as shown by the (P-Value = 0.027).

This means the Bank of Ghana Prime Rate significantly affect profit.

Also with the coefficient been positive with the magnitude of 909236.8, it means, whenever the Bank of Ghana Prime Rate is increased by one point unit, the profit will increased by 909236.8 point units.

This relation does not makes sense economically, because whenever bank rate increases the commercial banks interest rate will also increase to ensure some reasonable level of profit is obtained, but when other macro economic variables are not doing well and there are limited

avenue for investment coupled with high interest rate, many will not take loans and in the face of limited opportunities for the banks to invest, profit could fall.

In addition, an increase in prime rate will increase cost of living and causes standard of living to deteriorate.

TABLE 4.4 IMPACT OF IT EXPENDITURE ON COMMERCIAL BANKS DEPOSIT

deposit	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
itexp	138.6393	30.36488	4.57	0.000	79.1252	198.1533
_cons	6.71E+07	3.55E+07	1.89	0.059	-2444554	1.37E+08
sigma_u	0					
sigma_e	1.45E+08					
rho	0	(fraction of variance due to u_i)				

(Source Author's own)

The Table 4.4 presents the results of impact of IT expenditure on commercial banks' deposit. The results at 5% (two-tail test) level of significance shows that the variable (IT expenditure) is significant at one-sample test as shown by the (P-Value = 0.000).

This means that the when IT expenditure increase commercial banks' deposit will also increase. . Also with positive coefficient and magnitude of 6.71E+07, it means, whenever the bank increased IT expenditure by one point unit, the profit will increased by 6.71E+07 point units.

Finally the positive coefficient also implies the bank can still get some reasonable level of deposit using its current capacity without investing again in information technology.

The positive impact of IT expenditure on banks deposit makes some real economic sense in that any IT expenditure that found its way into the creation of new and efficient electronic

banking products such as deposit machines, Automated Teller Machine (ATM), debit cards, internet banking, mobile banking, etc. Will help to create more customers to increase savings deposits.

TABLE 4.5 IMPACT OF IT EXPENDITURE, DEPOSIT, BANK OF GHANA PRIME RATE AND LOAN ON COMMERCIAL BANKS PROFIT.

R-Square:			Observation per group : min = 9			
within = 0.9437			Average = 9.0			
Between = 0.9999			Maximum = 9			
Overall = 0.9855						
profit	Coefficient	Standard Error	Z	P > Z	[95% Conf. Interval]	
itexp	0.0976042	0.3290856	0.30	0.067	-0.54739	0.7426
deposit	0.0561061	0.0013657	41.08	0.000	0.053429	0.058783
bogpr	255157	124064.8	2.06	0.040	11994.53	498319.5
loan	-0.0005474	0.0006197	-0.88	0.377	-0.00176	0.000667
_cons	-3570410	1814299	-1.97	0.049	-7126372	-14448.6
Sigms_u	0					
Sigma_e	2027174.1					
Rho	0	(fraction of variance due to u_i)				

(Source: Author's own)

The Table 4.5 (Main Model) shows the results of the combined impact of all the choice variables (IT Expenditure, Deposit, Bank of Ghana Prime Rate and Loan) on the commercial banks profit.

The model shows that 50% of the choice variables are significant. The overall R-Square shows that the model is good since the combined effects of all the variables in the model explained 98.55% of the total variation in the regressand (the Profit).

The P-Value of 0.0000 is again highly significant at 5% level. The sign of the deposit was expected as more deposit mobilization improves profit.

The expenditure on information technology has insignificant effects on the profit with the Pvalues of 0.767. This was not expected as results from Tables 4.2 above showed otherwise.

The reasons that could be assigned to the statistically insignificant of the main variable of interest in the model could be that some exogenous factors such as changes in interest rate margin, amount of non-interest revenue that may have significant effect on the variables are not adequately controlled in the model.

The vast differences in the level of IT expenditure by the respective banks could also be a factor. From Table 4.1 (Summary Statistics) showed an overall range in IT expenditure values of whopping GH¢ 633, 1806.00. The IT expenditure between one bank form the other and within the banks from year to year given by the standard deviation values were GH¢ 807,277.50 and GH¢ 853286.80 respectively.

Again the fact that most of the banks treat expenditure on IT hardware as expense, increase in IT investment increases expenses and hence reduces operating profits.

Harvey and Osei (2010) in their work on the effect on investment in information technology on banks performance in Ghana concluded that banks with high level of investment in information

technology had greater positive impact on their profits than those with low level of investment in information technology.

Again, empirical evidence has shown that information technology expenditure that combined efficiently with effective business process reengineering and essentially persuaded rethinking and drastic redesigned of business processes via innovation to achieve impressive operational cost reduction, improved product quality, speed of service delivery improved profitability(Hammer, 1990; Hammer and Steven, 1995 Michael et al., 1996; Hargadon, Garlitz et al.,1993).

This means that information technology investment on its own cannot necessarily increased business profit unless it is able to create new and efficient banking products to satisfy consumers' needs.

Concluding from the above discussion, the findings provide enough grounds not to accept the null hypothesis (H_0) that IT investment makes direct significant impact on business profit (Strassmann, 1990; Morrison and Berndt, 1990; Dos Santos, Peffers and Mauer, 1993; Strassmann, 1997) in favour of alternative hypothesis, which says IT investment, does not make direct significant impact on business profit.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

5.0 INTRODUCTION

The chapter five provides the summary of findings and conclusion from the study as well as some recommendations to inform policy and future studies.

5.1 SUMMARY OF MAIN FINDINGS

The study examined the impact of information technology investment on the profit of selected commercial banks in Ghana.

It used data from five banks in the period of Nine years from 2006 to 2014. Trend analysis on profitability indicators were made to ascertain the fact that the selected banks were indeed doing well.

Regression analysis was used to measure the impact of information technology investment on the selected commercial banks profit. Two models were used.

The first regression model results showed that investment in information technology impact positively on the profit of the sampled commercial banks which was expected. However, the second model showed otherwise on which basis the failure to accept the null hypothesis.

Finally, from the above showed that the commercial banks investment in information technology is “a means to an end” and hence when such investments do not impact positively on the business processes and activities to make them more efficient and effective, then IT investment will not improve profit.

Managers of commercial banks therefore, should not be interested in continuously investing in new information technology facilities but rather ensure efficient utilisation of minimal installed capacities that can be used with new and innovative financial products and services to enable them to stay in competition within the industry as well as enhance their share of the market.

5.2 CONCLUSION

The study found out that expenditure on information technology has **no direct** impact on the profit of the commercial banks (Strassmann, 1990; Morrison and Berndt, 1990; Dos Santos, Peffers and Mauer, 1993; Strassmann, 1997).

However, information technology can be used to mobilise deposits and monitor loans to reduce non performance rate which in effect would have positive impact on overall business profit.

5.3 RECOMMENDATIONS

The believe that usage of complex information technology facilities in organisations is the magic that gives astronomical growth in performance should be re-examined.

The study recommends that commercial banks in Ghana should take a second look at continuous investment in information technology facilities, as it may not necessarily give them the profit they are through thick and thin looking for directly.

The researcher recommends future studies should consider using **large sample size as well as more and other variables of performance indicator** to examine the impact of information technology on performance of commercial banks in order to make a tentative generalisation.

The researcher again recommends future studies should consider using **different models** especially those that can **incorporate reactions of competitors** to a bank's investment in IT to examine the impact of information technology investment on performance of commercial banks contribute to the information technology productivity paradox debate.

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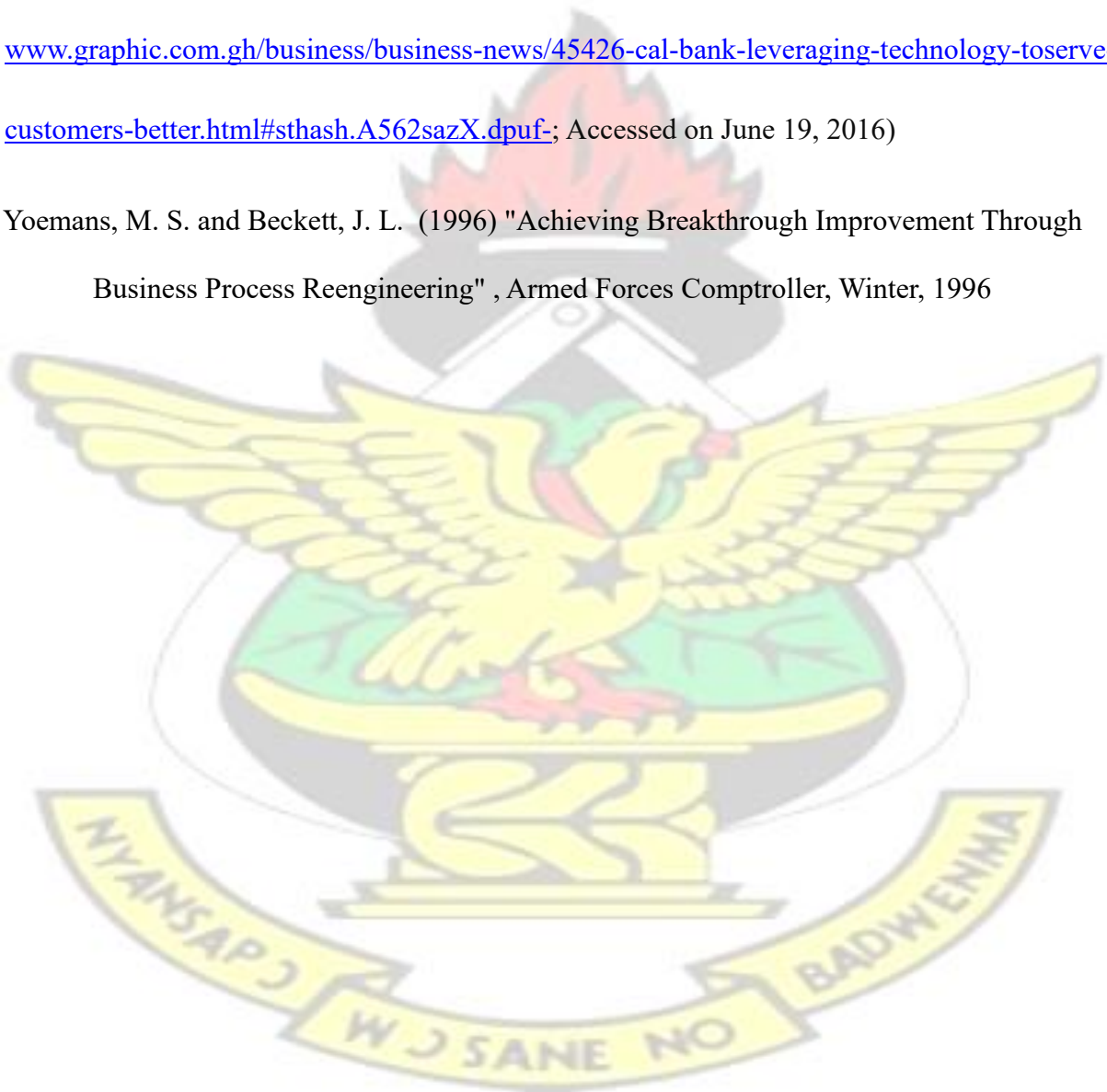
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APPENDICES

APPENDIX –A: The Banking Industry’s Returns On Equity (ROE)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014
ROE	28.4	26.5	22.0	12.1	16.6	17.8	23.8	27.5	Not Published

Source: Pricewaterhouse Coopers (PwC)

APPENDIX –B: Shapiro- Wilk W test Results.

Variable	Observation	W	V	Z	Prob > Z
u	45	0.53183	20.274	6.378	0.00000

(Source Author’s own)

The Table above shows the results from the Shapiro-Wilk W test was used to determine the validity of the model. This was done by finding out whether the idiosyncratic errors (u) were normally distributed. The P-value of (0.00000) confirmed the normality of the data.

APPENDIX –C: Panel unit root tests

Ho: All Panels are stationary	Number of Panel	5
Ha: Some panels contain unit root	Number of periods	9
Time trend: Not included	Asymptotic: T, N ->Infinity	
Heteroskedasticity: Not robust	sequentially	
LR variance: (not used)		
Statistic	P-Value	
Z 8.1776	0.000	

(Source Author's own)

The Table above shows the results from the Panel unit root tests. This was used to determine whether all panels are stationary. The P-Value (0.000) was significant at 0.05% level and hence assured the panel is stationary so GLS model if used is efficient and unbiased

APPENDIX –

D: First Difference Test

R-Square:			Observation Per group:			
Within = 0.3242			Minimum	=	8	
Between = 0.9999			Average	=	8.0	
Overall = 0.6694			Maximum	=	8	
Corr(u _i , X) = (assumed)			Prob > Chi ²	=	0.0000	
D.profit	Coefficient	Std. Error	Z	P > Z	[95% Conf.Interval]	
itexp						
D1.	0.1826717	0.332993	0.55	0.583	-0.46998	0.835326
deposit						
D1.	0.0569464	0.006998	8.14	0.000	0.043231	0.070662
bogpr						
D1.	309097.7	157040.2	1.97	0.049	1304.548	616890.9
loan						
D1.	-0.0002335	0.00157	-0.15	0.882	-0.00331	0.002843
_cons	-142655.2	481688.9	-0.30	0.767	-1086748	801437.7
Sigma_u	0					
Sigma_e	2462008.7					
Rho	0	(fraction of variance due to u _i)				

(Source: Author's own)

APPENDIX E: The Hausman Test Results

	-----Coefficient -----			
	(b)	(B)	(b-B)	sqrt (diag (V_b-V_B))
	fixed	random	Difference	S.E.
itexp	-.048243	.0976042	-.1458472	.1517378
deposit	.0539337	.0561061	-.0021724	.0018903
bogpr	284607.3	255157	29450.29	49069.3
loan	-.000624	-.0005474	-.0000767	.0004243
b = consistent under Ho Ha; obtained from xtreg B = inconsistent under Ha, efficient Ho; under obtained from xtreg Test: Ho difference in coefficient not systematic				
	Chi ² (1) = (b-B)'[(V_b-V_B) ⁻¹](b-B)			
	= 0.36			
	Prob > chi ² = 0.5484			

(Source Author's own)