

**THE RELATIONSHIP BETWEEN ELECTRONIC PAYMENTS
AND OPERATING COSTS OF COMMERCIAL BANKS IN
KENYA**

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D61/8375/2006

**A RESEARCH PROJECT SUBMITTED IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD
OF THE DEGREE OF MASTER OF BUSINESS
ADMINISTRATION, UNIVERSITY OF NAIROBI**

NOVEMBER 2012

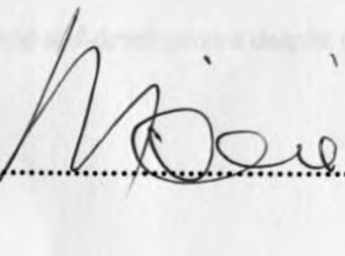
DECLARATION

This Research Project is my original work and has not been presented for a degree in any other University or institution of learning to the best of my knowledge.

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ACKNOWLEDGEMENT

I wish to record my gratitude first and foremost to my supervisor Mr. Mirie Mwangi who tirelessly devoted much of his time to supervise the writing of this project. Through his expert guidance, encouragement and constructive criticisms I was able to complete this project paper.

Secondly, my gratitude goes to my wife, Linnah Ngute Kilonzi for her moral support without which I would have not managed to complete my Master's Degree in Business Administration. My acknowledgement also goes to my children Tonny Mutemi Kilonzi, Caleb Mutisya Kilonzi, and Steve Mwasya Kilonzi for allowing me to be away from them throughout my period of study.

Finally, I am greatly indebted to all my friends at Central Bank of Kenya, my collage mates and others who in one way or another kept encouraging me to focus in my studies and self-development despite difficulty office challenges.

DEDICATION

I dedicate this project to my Wife, Linnah and Sons Tonny, Caleb and Steve for their love and warm understanding.

ABSTRACT

This study was a research whose objective was to determine the relationship between electronic payments and commercial banks operating costs in Kenya. Secondary data on commercial banks operational costs, assets and transactions processed through the three key payment systems in Kenya including the Real Time Gross Settlement (RTGS) System, the payment card system, and the Automated Clearing House was obtained from the Central Bank of Kenya's Bank Supervision Department and the National Payments System Division.

The study was conducted using census survey. The population of interest for the study comprised the 43 banks in Kenya as at end of December 31st, 2011. Data on commercial banks operating costs, number of transactions through the three payment systems studied, and commercial banks assets was obtained from the Central Bank of Kenya's Bank Supervision Department using the data capture form in appendix IV. Data was analyzed using e-views to generate the necessary descriptive statistics used to interpret the relationship between operating costs and electronic payments for commercial banks in Kenya.

From the findings, the study found that commercial banks operational costs increased at a decreasing rate with increased volume of transactions through the RTGS System which is wholly owned by the Central Bank of Kenya. This reflected increased efficiency associated with the adoption of secure and faster mode of payments. The study also revealed that ownership of a payment system had an impact on operational costs in the sense that where the system is owned wholly by the central bank, commercial banks can use that system to minimize on operational costs. The study

therefore recommends use of outsourced payment systems by commercial banks as opposed to proprietary systems which do not help minimize costs. Outsourced payment systems refers to third party payment systems like Kenswitch, PesaPoint or even KEPSS whose ownership is somehow delinked from commercial banks. On the other hand, proprietary systems are those payment networks (systems) whose ownership is that of a particular commercial bank. For example, most big banks in Kenya have their own ATM networks for which they spent a lot of resources to maintain.

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ABBREVIATIONS

ACH	Automated Clearing House
ATMs	Automated Teller Machines
BIS	Bank for International Settlement
ECB	European Central Bank
E-Commerce	Electronic Commerce
EFTPOS	Electronic Funds Transfer Point of Sale
ELE	Share of Electronic Payments
E-Money	Electronic Money
EU	European Union
GDP	Gross Domestic Product
ICT	Information Communication Technology
IT	Information Technology
OC	Operating Costs
PC	Personal Computer
PCI	Payment Card Industry
RTGS	Real Time Gross Settlement System
TA	Total Assets
KEPSS	Kenya Electronic Payment and Settlement System

CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

Electronic Payments can be widely defined as payments that are initiated, processed and received electronically (ECB, 2004). They can also be defined as instructions passed between banks without reliance on paper processing or shipment. These systems are ideal for high volume, repetitive payments such as wage and utility bills and for moving large, time sensitive payments. Essentially, electronic payments are not always cost effective for high volume, low value payments that are not time sensitive, particularly in emerging countries with limited access to technology (Robert & Fernando, 1994). It is important to note at this point that the reform and modernization process in Kenya which commenced in the second half of 1990's was mainly geared towards automation of various banking processes to phase out the then existing manual procedures thereby enhancing the payment process.

A wide range of initiatives for electronic payments over the internet and wireless networks have been developed by a large number of payment service providers, including financial institutions and new providers of payment services comprising technology and telecommunication companies. For the services banks offer to their customers, ATMs services are considerably cheaper than branches and an electronic payment only costs about one-third to one-half as much as a paper-based transaction. Thus the shift to ATMs and other electronic payments may be associated with significant reduction in operating cost as a percentage of bank assets. Electronic debit

card or giro payments for point-of-sale transactions, consumer bill payments, and employee disbursement are typically cheaper than their paper-based alternatives (Flatraaker & Robinson, 1995; Humphrey, Kim, & Vale, 2001). Thus the large expansion of ATMs relative to branch offices combined with the shift to electronic payments would be expected to lower banks unit operating costs. Snellman, Vesale, & Humphrey (2000) argued that as electronic bill payments and payroll disbursements are automated and debit cards substituted for cash at the point-of-sale, there is less need for direct bank-to-customer interaction, allowing banks to reduce the number and size of branch offices and thus lower service delivery expenses.

1.1.1. Changing Technology and Cost Efficiency in Banking

Santiago, Humphrey, & Paso (2004) argued that of the numerous technological changes in the banking industry, two stood out as having a large impact on operating costs. These were the expanded use of ATMs to supplement and replace expensive branch offices in delivering an important subset of depositor services and the concurrent substitution of low cost electronic payments for paper-based transactions. This study will seek to quantify the overall effect these emerging electronic payments in service delivery have had on banking operating costs in Kenya. Santiago, Humphrey, & Paso (2004) argued that banks in the EU apparently saved 37% in unit (or average) operating costs between 1992 and 2000 which translated into 4.5 million euros for the banking system as a whole as they progressively shifted from offices to ATMs for dispensing cash and also processing higher volumes of low cost electronic payments.

1.1.2. Electronic Payments and Overall Operating Expenses

A study by the European Central Bank (ECB, 1999) observed that owing to a variety of factors, there was considerable uncertainty concerning the effects of electronic payments on bank's overall operating costs, although the potential reductions in the costs per transaction seemed undisputed. The potential size of the reductions and the speed at which this could be realized being such that: a relatively large volume (critical mass) has to be built up before overall costs fall in the business areas that exhibit economies of scale; full realization of the cost savings may require the elimination of redundancies (overlapping capacities and outdated functions), which may take time; considerable time must be allowed for customers to alter their banking habits and make greater use of the new delivery channels, which forces banks to maintain duplicate capacities for different customer segments; an apparent quality shift in personnel raises salaries and staff-training requirements – this would raise the cost of existing personnel, although total staff costs could fall due to the reduction in the number of employees; banks are forced to invest in the latest versions of hardware and software, or to contribute to software development costs, in order to compete effectively; and the costs of both IT and labour for banks may temporarily increase in the short term. The study concluded that the overall costs in the banking system were expected to decrease only in the long term as a result of these challenges.

1.1.3. Theoretical Impact of Electronic Payments on Operating Costs

Humphrey, Willeson, Lindblom & Bergendahl (2003) argued that if the differences in costs between electronic payments and its paper-based alternatives could be operationalized into cost savings, the application to payment volumes suggests that a

country may save 1 per cent or more of its GDP annually by switching from all paper to all electronic payments. Econometric analysis suggests that the shift to electronic payments may reduce the cost of making a payment by 45 per cent relative to the paper based method. This shift, along with the reduction of expansive branch offices, leads to the reduction of the ratio of bank operating costs to total asset value.

Humphrey et al. (2003) notes that electronic payments are considerably cheaper than their paper-based alternatives including cash thus Banks and Merchants are usually interested in shifting users to electronic payments to save on operating costs, as are some government policy makers who seek to improve the cost efficiency of their nation's payment systems.

ECB (2007) observed that in the short run, i.e. during the existence of old and new payment methods, the banking industry expects investment in new electronic payments methods to lead to increased operational costs and a relatively limited impact on the revenue side. However, in the long term, when old payment methods are fully replaced with modern electronic payment methods, the costs for banks are expected to decrease because of potential economies of scale, scope and innovations.

1.1.4. Commercial Banks in Kenya

As at December 31st, 2011, there were 43 Commercial Banks in Kenya with a total net asset base of Ksh 2,021 billion. Out of these 43 banks, 30 were locally owned while 13 were foreign owned. Locally owned banks accounted for 67.70 per cent of

the total net assets while the foreign owned commercial banks accounted for 35.30 per cent of the total net assets.

Total operating expenses increased by 13.90 percent from Ksh 104 billion as December 31st, 2010 to Ksh 118 billion as at December 31st, 2011 (CBK 2011). The Banking Industry is divided into three categories including Large, Medium and Small banks. Large banks are those whose assets are greater than 5 per cent of the total banking industry assets while medium and small banks are those with assets ranging between 1 per cent to 5 per cent and below 1 per cent respectively as per 2011 Central Bank's Bank Supervision Annual Report.

1.1.5. Electronic Payments in Kenya

The government of Kenya commenced the Payments System reform and modernization process after mid 1990's. This reform process was aimed at modernizing both the wholesale (Large Value Payment) and the retail payment (Low Value Payment) systems. These include the Inter-bank Settlement System, the Clearing House, the Automated Teller Machine networks, and the mobile phone money transfer services among others. Safe, efficient, and effective payment systems enhance the effectiveness of the financial system, boost customer confidence and facilitate proper functioning of the commercial activities (Anna 2001).

The efficiency of payment systems highly depends on the institutional and infrastructural frameworks. Institutional arrangements between market players such as

central banks, regulatory agencies, and the Ministries of Finance play a vital role in the development of payment systems. Coordination between such entities promotes efficient development by avoiding duplicative investments; thus fostering greater payment transactions. A Payment System infrastructure is defined as a set of clearing and settlement systems involving payment service providers and financial institutions that handle different stages of the payment process including transmission, confirmation, clearing and settlement.

The National Payments System industry in Kenya comprises the wholesale payments system segment which mainly facilitates the inter-bank dealing and the retail payment system that facilitates mainly the exchange of low value payments. The retail payment system segment comprises the banking industry Automated Teller Machines (ATMs) network, the Automated Clearing House, the mobile phone money transfer industry, the PesaPoint ATM network, and the Kenswitch network. The National Payments System industry is regulated to a great extent under the Central Bank of Kenya Act Section 4A 1(d) which gives the Central Bank of Kenya powers to formulate and implement policies as best promote the establishment, regulation and supervision of efficient and effective payment, clearing and settlement systems (Legal notice No. 15 of 2003).

1.2. Statement of the Problem

The usage of electronic payments has seen tremendous growth in financial services industry in the last two decades. In the banking industry, the introduction of electronic payments like internet banking, Automated Teller Machines, Mobile Phone Money

Transfers, Real Time Gross Settlement Systems, and Electronic Funds Transfers, has seen banks provide a wide variety of services to customers with less manpower (Berger, 2003).

There exist possibly two positive effects regarding the relation between electronic payments and banks performance. First, electronic payments can reduce banks operational costs (the cost advantage) and second, electronic payments can facilitate transactions among customers within the same network (network effect) (Farrel & Salender, 1985; Katz & Shapiro, 1985; Economides & Salop, 1992). Humphrey et al., (2003) studied the relationship between operating costs and the total number of cheques, paper giro, electronic giro, and card transactions along with the number of ATMs and branch offices. The study observed that reduction in unit operating expenses was associated with the rise in electronic payments.

A good case for consideration is the Automated Teller Machines (ATMs) by banks. If ATMs are largely available over geographically dispersed areas, the benefits from using ATMs will increase since customers will be able to access their bank accounts from any geographical location they want. This would imply that the value of a bank's ATM network increases with the number of available ATM locations, and the value of a bank's network to a customer will be determined in part by the final network size of the bank. In the last few years, many countries have experienced a positive increase in the number of supporting outlets to conduct cashless payment transactions including Automated Teller Machines and EFTPOS terminals. EFTPOS terminals are at a retail location which is designed to capture, and in some cases also

transmit, debit card transactions by electronic means (Berger, 2003). This paper seeks to examine the impact of electronic payment systems on the operational efficiency and costs of commercial banks in Kenya. It is believed that electronic payments can improve bank's performance in two ways; electronic payments can reduce operational costs (cost effect) and can also facilitate transactions among customers within the same network (network effect) Humphrey et al. (2006).

ECB (1999) studied the relationship of bank operating costs with developments in new technology and concluded that investment in new banking technologies had been attracted by the possibility of achieving significant reduction in cost of producing banking transactions, which also promised to lower the overall operating costs. Overall, a number of studies in this field have been carried out elsewhere but not in Kenya. Thus despite the Government's effort to reform and modernize payment systems in Kenya, no critical assessment has been carried out locally to try and quantify the impact of increased usage of electronic payments on bank operational costs. This study therefore seeks to answer the question? How has the modernization and adoption of electronic payment systems affected banking operational costs in Kenya?

1.3. Objective of the Study

To determine the relationship between electronic payments and commercial banks operating costs in Kenya.

1.4. Importance of the Study

The findings of the study will be valuable to the banking sector in a number of ways. First, the results will help bank management in appreciating the importance of using electronic means of payment in minimizing operational costs. If increased use of electronic payments leads to lower operating costs, then banks would utilize more of such systems to maximize revenues. Second, it will help policy makers in making strategic decisions relating to payment systems reform and modernization process. For instance, if increased use of electronic payments minimizes operating bank costs, then policy makers will use this information to guide the reform and modernization strategy. Finally, it will also contribute to the existing literature on the electronic payment systems in Kenya. Scholars will also benefit from the findings in identifying areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This study seeks to explore the impact of electronic payments technology on banking operational costs in Kenya. It looks at how technology affects the provision of banking services such as remote banking; geographic expansion of banking services; operating costs through provision of wholesale banking through Real Time Gross Settlement (RTGS) System; banking operational costs through increased usage of electronic payment channels (networks) and unit operating costs. It concludes by looking at the economic impact of electronic payments.

2.2. Theoretical Review

Santiago, Humphrey, & Paso (2004) state that of the numerous technical changes in banking, two stand out as having a large impact on operating costs. These are the expanded use of Automated Teller Machines (ATMs) to supplement and replace expansive branch offices in delivering an important subset of depositor services and the concurrent substitution of lower cost electronic payments for paper-based transactions. Both of these newer banking technologies intensively use computers and telecommunication facilities and have benefitted from cost reductions and efficiency improvements in these important inputs. The objective in this study was to quantify the overall effect the new banking technologies in service delivery and payment methods had on banking costs. This was ascertained by using a statistical model that

relates costs to certain physical characteristics of service delivery and payment levels for commercial banks.

Santiago et al., (2004) argues that as larger institutions have progressed further in shifting from branch offices to ATMs and other electronic payments for dispensing cash and also processing higher volumes of low cost electronic payments, these institutions have benefitted the most from the reduction in unit operating costs. They concluded that two common trends among banking systems in developed countries have had a large impact on operating costs of commercial banks and hence on service level and price to users. One trend has been the expansion of low cost and most convenient ATMs, relative to branch offices; to deliver cash, account transfer, and balance inquiry services to depositors. A second trend has been the ongoing replacement of paper-based payment instruments with low cost electronic payments.

ECB (1999) observed that increased use of modern electronic payment systems through Information Technology (IT) developments affect banking in two main ways. First, they contribute to the reduction of the costs associated with management of information by replacing paper-based and labour-intensive methods with automated processes. Second, they modify the ways in which customers, have access to banking services and products, mainly through automated channels (remote banking). ECB noted that whereas improvement in the area of information management have been taking place for a long time, remote banking is a more recent phenomenon with developments occurring more progressively, especially in retail banking.

2.2.1. Remote Banking

Remote banking is today offered by at least all major banks throughout European Union (EU). Most of the standard retail banking services are, offered via ATMs and telephone banking. Variations across countries are substantial, however, with regard to the specific models of remote banking and customer acceptance. Online PC banking and internet banking are generally not yet widespread, although most major banks have established Web sites for information purposes. In the future, internet banking is expected to have the higher growth potential, incorporating increasingly sophisticated products. On the other hand, the use of electronic money (e-money) has taken off more slowly than might have been expected. The main reason for this being the slow acceptance by merchants, cost challenges, security concerns, lack of cross-border compatibility and incompleteness of the regulatory framework. Nonetheless, the use of e-money might gain momentum once a certain critical mass has been reached (ECB, 1999).

2.2.2. Factors Affecting Operating Costs

Owing to a variety of factors, there is considerable uncertainty concerning the effects of electronic payments investments on banks' overall operating cost, although the potential reductions in the costs per transaction seem undisputed. There may be some over-optimism about the potential size of the reductions and the speed at which they can be realized for the following reasons;

- (i) A relatively large volume has to be built up before overall costs fall in the business areas that exhibit economies of scale. This includes businesses where

there are substantial initial investments costs but low unit costs for executing individual transactions such as in the case for Real Time Gross Settlement (RTGS) systems;

- (ii) Full realization of the cost savings may require the elimination of existing redundancies, which may take time;
- (iii) Considerable time must be allowed for customers to alter their banking habits and make greater use of the new delivery channels, which forces banks to maintain duplicate capacities for different customer segments;
- (iv) An apparent quality shift in personnel raises salaries and staff-training requirements. Banks may also increasingly need to raise salaries to avoid a brain drain in favour of competitors. This would raise the cost of existing personnel, although total staff costs could fall due to the reduction in the number of employees and;
- (v) Banks are often forced to invest in the latest versions of hardware and software, or to contribute to software development costs, in order to compete effectively.

ECB (1999) concluded that the overall costs in banking can be expected to decrease only in the longer term as a result of factors above. However, in most cases the overall cost reductions are not expected to be dramatic.

2.2.3. Electronic Payments and Geographic Expansion of Banking Services

Bolt & Humphrey (2007) argued that from an economic perspective, efficient and safe payment systems are important insofar as they facilitate real and financial transactions in economies. Their production is subject to economies of scale due to the significant investment in infrastructure needed to start the operation and the relatively small marginal cost of services provided using the existing infrastructure. They provide evidence that standardization of retail payment instruments across the Euro area was likely to result in economies of scale in payment services in Europe. Beijnen & Bolt (2009) further point out that, similar economies of scale effects are to be gained in the European payment processing industry.

Berger & DeYoung (2006) showed that technological progress had facilitated the geographic expansion of the banking industry. Specifically, ATMs, POS terminals and similar technologies could potentially reduce the costs of asset convertibility for households over time. They also reported higher volumes and lower costs after the merger of competing ATMs into a national switch.

2.2.4. Real Time Gross Settlement Systems and Banking Operating Costs

Morten & Kimmo (2002) observed that during the last few decades, most industrialized countries have introduced Real Time Gross Settlement (RTGS) systems for settlement of large, time critical inter-bank payments. In RTGS systems, payments are settled continuously and individually in real time during the day and payments are

only made if the funds on the settlement account are sufficient. Settlement in RTGS systems carries no credit risk and thus a low level of systemic risks. The reduction in these risks is however traded against increased liquidity requirements and thereby increased liquidity risk. The liquidity risks can be significant because of the pivotal role of these systems in the economy, and due to the high value transferred in these systems.

Morten & Kimmo argued that mobilizing the required liquidity imposes costs on the banks; all other things being equal, the banks have an incentive to economize on liquidity and may prefer to wait for incoming payments before sending their own payments. This can lead to delays and gridlocks. Delays in payments might not only be costly for banks with insufficient liquidity, but also to other banks. In most RTGS systems the majority of liquidity used for settling comes in the form of incoming payments and a delay in sending payments might cause liquidity problems for other banks in the system.

Morten & Bart (September 2007) argues that the opportunity cost of collateral eligible for intra-day credit from central banks is low in Europe and delays and consequential gridlocks are generally not a problem in these systems (RTGS). However, this situation may change in a situation where banks have to provide collateral for other purposes, which increases the cost of intra-day liquidity or where they are required to raise liquidity at shorter notice. They further point out that at the apex of the financial system is a number of critical financial markets that provide the means for agents to allocate capital and manage their risk exposures. Instrumental to the smooth

functioning of these markets is a set of financial infrastructures that facilitates clearing and settlement. Many of these infrastructures use the inter-bank payment system to achieve final settlement. In addition, most central banks use the inter-bank payment system to implement monetary policy, and the system also serves as the platform for the inter-bank money market. They conclude by pointing out that an efficient and resilient inter-bank payment system reduces transaction costs for agents in the economy and is a precondition for the successful implementation of the monetary policy and ensuring financial stability.

2.2.5. Electronic Payment Network and Bank Operating Costs

Visa (June, 2003) pointed out that electronic payment network have the potential to provide cost savings of at least 1 per cent of GDP annually over paper-based systems through increased velocity, reduced friction and low costs. For the U.S. economy, that translates into roughly US\$ 60 billion in annual savings. In the U.K., economy savings would be on the order of US\$ 10 billion annually. Visa argues that electronic payment products can act as gateways into the banking system for unbanked segments which make up as much as 70 per cent of the world's population.

Humphrey et al. (2003) argues that excluding interest expenses, a cost function is estimated that relates total operating cost to the total annual number of Cheques, paper giro, electronic giro, and card transactions along with the number of ATMs and branch offices while controlling for differences in input prices. As the vast majority of bank operating expenses derive from processing and accounting for payments, delivering cash through ATMs, and taking deposits and distributing loans at branch

offices, the above specification allows the illustration of how payment costs and ATMs and branch service delivery expenses have varied over time. The usual approach for identifying cost relationships in banking industry relates total operating plus interest costs to the value of the stock of loans, deposits, securities, etc., under the assumption that changes in these stocks reflect changes in the underlying flow of banking services.

2.2.6. Banking Operating Costs and Banking Total Assets

In the banking industry, the ratio of operating expenses to the value of total assets (OC/TA) is an accepted indicator of unit operating costs. The OC/TA ratio is an indicator of the labour, materials, outsourcing, and capital consumption costs of producing the flow of banking services which underlies the value of total assets. In order to reflect properly the cost experience for banks as a whole, OC/TA measure could be computed as the sum of total operating expenses (OC) in the banking industry divided by the sum of the value of all assets (TA). The payment instruments relative to this study being the RTGS transactions; non-cash transactions, two of which are paper-based (cheques and paper giro payments) and two that are electronic (electronic giro and debit and credit card) transactions, and mobile money transactions. This study observed that the reduction in unit operating expenses was associated with the rise in electronic giro and card-based payments along with the reduction in (cheque) and paper giro transactions (Flatraaker & Robinson, 1995; Wells, 1996).

Humphrey, Willeson, Lindblom, & (2007) argued that the processing of payment transactions, crediting deposit accounts, and safekeeping of funds generates the vast majority of bank back-office labour and capital expenses. They note that electronic debit or giro payments for point-of-sale transactions, consumer bill payments, and employee disbursements are typically much cheaper than their paper-based alternatives.

ECB (1999) noted that as an all-encompassing development, new technology has important implications for all aspects of banks' strategy and offers major opportunities through investment in the following areas:

1. Integration of the latest generation of Information Technology (IT) into bank's internal processes, product and distribution methods in order to gain competitive advantages and increase market share, as well as to improve efficiency and risk management;
2. The formation of alliances with technology partners and telecommunications operators in order to create common platforms which allow further developments in the effective application of the most up-to-date IT and to optimize research and development and implementation costs; and
3. Diversification into other business areas, such as electronic commerce, non-financial services and becoming service aggregators.

E-commerce is a commercial activity dealing with the trading of goods and services and with other related business activities, in which the electronic communication medium plays a central role. These activities include the communication of

information, the management of payment, the negotiating and trading of financial instruments, and the management of transport (Magutu, 2011).

ECB (2007) argued that technology is an important strategic tool for banks to safeguard long-term competitiveness, cost efficiency and profitability. There are considerable potential benefits in many areas of the banking business, as technology enables banks to obtain additional marketing instruments and a better knowledge of the needs and habits of their customers and possibly to achieve significant cost reductions. Banks are generally faced with a strategic choice of when and what way to invest in order to exploit the available opportunities and to increase the range of services requested by their customers. Banks may choose to be technology leaders or only gradually to adopt their strategies. In any case, banks need to be fully aware of new developments in order to sustain their market position, as barriers to entry tend to diminish and competition can increase significantly. Banks also need to be aware of the risk of being technology leaders, since the followers may have a lower cost burden to bear. Investment in new banking technologies have been attracted by the possibility of achieving significant reductions in the costs of producing various banking transactions, which also promises to lower the overall operating costs.

In the study by the ECB (2007), all the banks which were interviewed generally expected a clear reduction in the cost per transaction for all banking activities as a result of technological advances, especially for retail securities business, retail payment transactions and retail deposit business. The expected cost reductions were attributable to a number of factors:

1. The lower overall cost of automated as compared with labour-intensive processing of transactions due to the streamlining of physical branches and the associated reduction of the labour force;
2. The existence of greater economies of scale in automated as opposed to labour-intensive processing of transactions and the associated cost savings due to the centralization of information collection and transaction processing function;
3. The rationalization of production and distribution structures and the standardization of banking processes;
4. The shorter response times and improved utilization of customer information; and
5. The cross-selling of third-party products, such as travel and insurance products.

The cost of making a payment will vary across different payment instruments due to differences in their production functions, most notably their scarce economies and the technology used as well as their scale of operations. For more than a decade, Norway has collected representative information on the bank cost of handling different payment instruments. This includes; labour, building, materials, and computer expenses incurred in processing payments as well as allocated bank branch office expenses associated with payments. Over 1988-2001, the approximate weighted average bank cost per transaction fell from €1.93 to only €0.73, a reduction of 62 per cent over 13 years (7.2 percent a year in nominal terms). The reduction in unit cost was the result of scale effects as well as the shift to low cost electronic payments (Humphrey et al. 2003). For Norway, an electronic payment cost only 33 percent (debit card) to 64 per cent (giro) as much as what a paper-based giro transaction costs.

Schmitz (2006) observed that institutional changes affect the choice between direct and indirect participation in inter-bank small value payments systems. The spreading collateral requirements and increasing technologies sophistication increase costs of direct participation. However, advances in ICT and increasing transactions volumes decrease the cost of operating and accessing payment systems at the margin for, both, direct and indirect participants. The impact on relative costs of direct and indirect participation remains ambiguous and the evidence is also inconclusive.

Magutu (2011) argue that three primary processes are enhanced in electronic payment environment and they are; the production processes in the first place which include procurement, ordering and replenishment of stocks; processing of payments; electronic links with suppliers; and production control processes among others. The second is customer focused processes, which include promotional and marketing efforts, selling over the internet, processing of customers' purchase orders and payments, and customer support among others. An internal management process, which is the third, includes employee services, training, internal information-sharing, video-conferencing, and recruiting. Generally, electronic applications enhance information flow between production and sales forces to improve sales force productivity

2.2.7. Cost Reduction from Greater Use of Electronic Payments

The share of the volume of electronic payment transactions in all non-cash payments in Norway is a direct indicator of how rapidly payments have shifted to electronics. Electronic payments are often more convenient to use and, as well, banks charge a

higher per transaction price for paper-based instruments. As payment data for each bank over time are not separately available, Humphrey et al, used ELE to refer to the share of electronic payments for all banks in each year. They established that the share of electronic payments rose from 15.6 per cent of all non-cash payments in 1987 to 74.1 per cent in 1998.

To determine the change in average cost associated with the shift to electronic payments for the banking industry as a whole, Humphrey *et al*, computed two values of predicted average cost. This applied to all banks for each year over 1987-1998 using each of the previously estimated cost functions, one computed average cost for 1988, for example, uses the value of the share of electronic payments in 1988, along with loan output levels and output prices for 1988. Average cost was then recomputed with the only change being the share of electronic payments for 1987 substituted for that of 1988. As $ELE_t > ELE_{t-1}$ for all t , they concluded that there was a steady shift to electronics each year. They argued that if the first computation using the 1988 ELE value is less than the second computation using the 1987 ELE value, then costs were deemed to have fallen as a result of the shift to electronic payments. They noted that while the share of electronic payments increased in each year, average cost was not always on the fall. Their study revealed that average cost for the banking system apparently rose by 5.4 per cent in 1988 with greater electronic payments but fell in almost all other years. On average for the industry as a whole, unit costs were estimated to have fallen 1.3 per cent per year with the shift to electronic payments, or by 13 per cent over the whole period of study. They concluded also that the reduction in total costs from the shift to electronic payments only affected operating expenses.

Chu-fen (2007) observed that over the past few decades, modern business organizations have been investing increasingly substantial amounts of money in information technology (IT) with the objective of improving their operational efficiency and competitive ability in the industry. He also observed that the important role IT plays in contemporary business is unquestionable. He pointed out that IT is regarded as a critical factor for business enterprises to survive and to grow further; however, empirical evidence in support of these anticipated benefits has been mixed. He pointed out that some researchers asserted that IT investments can really promote the enterprises' operational performance by reducing costs, raising profit margin, upgrading production levels, increasing service quality, advancing customer satisfaction and improving overall operations. In contrast, other researchers did not demonstrate the positive effect of IT investments and concluded that IT spending brought no significant contributions to the enterprises' operations, and so the IT productivity paradox has been an issue of continuous debate for decades.

Snellman, Vesala, & Humphrey (2000) argued that financial authorities throughout the world have recognized the need for further improvement of electronic payments systems, but they face a number of challenges in advancing this goal. These challenges include among others; low level banking penetration among the population which tends to perpetuate customer habits of paying with cash, which in turn fuels the informal economy and is a major obstacle to more effective use of electronic payments. Automation has created opportunities for depository institutions and other payment processors not only to introduce new payment instruments, but also to

reduce their transaction costs in processing paper and electronic payments. Costs of electronic payment instruments are usually one third to half of those related to paper-based instruments. Further, complete migration to electronic payment instruments in a given country would result in annual cost reduction equivalent to one to three percent of the GDP. Kalung'e (2009) observed that internet made it easier and less expensive for banks to reach customers directly. She also noted that internet enabled customers to have full information about products among many other benefits.

2.3. Economic Impact of Electronic Payments

Some of the benefits that accrue to an organization from the implementation of electronic payments are increased revenue since the organization will be able to reach more customers, improved customer satisfaction since services will be readily available and fast in their provision, cost reduction since it will not have to incur heavy wage, reduced space requirements and hence reduce rent or lease payments (Magutu 2011). Other benefits include increased efficiency since automation enables the organization to do more with less input, increased level of output and employee satisfaction and motivation since they will not have to toil really hard. Large market share through attraction of new customers and customer loyalty may be gained.

The tangible benefits of electronic payments are benefits that directly accrue to the organization and contribute directly to increased revenue and profit. These include: efficiency which is the ability of the business process to produce the same level of output using reduced resource output or to produce more output using the same level of input (Fraser, Fraser, & McDonald, 2000). Increased automation of processes

where most of the operational activities which were done by people are carried out by machines without physical presence of people. Reduced operational costs, when people are replaced by machines in an organization are as a result of reduced salaries.

During the 1960s and 1970s, technical change was focused on automating internal bank deposit and loan accounting procedures. During the 1980s and 1990s, technical change in Europe generally and in Norway in particular was associated with a strong shift to lower cost electronic payments. An electronic payment using a debit card, a giro, or an Automated Clearing House (ACH) credit or debit transfer can reduce a bank's payment cost per transaction by from one half to two thirds depending on how the instrument is used and whether or not users are separately notified prior to the transaction (Humphrey, 2003). This is because an electronic payment only costs a bank from one-third to one-half of what a corresponding paper-based non-cash payment would cost (Flatraaker & Robinson (1985); Humphrey, Kim & Vale (2001). Wanjiru (2010) observed that companies have in recent times embraced cost cutting strategies in their organizations in all possible ways so as to reduce on the costs of operations. Such cutting cost strategies include the use of electronic payments.

2.4. Empirical Studies

A number of studies have been carried out on the impact of electronic payments on Banking Operational costs but mainly in Europe and United States of America (USA). There is however, no documented literature on the impact of electronic payments on banking operational costs in Kenya.

Humphrey, Willeson, Bergendahl, & Lindblom (2003) argue that most people pay little attention to their country's payment system, the banking infrastructure which transfers funds among individuals and organizations. Their only concern is the bank fees they pay to use their own money. When direct costs for users of payment services are related to the underlying differential expense of electronic versus paper-based transactions, a country's payment costs can fall in real terms. If a country is able to shift from an all paper-based to an all-electronic-based payment system, annual savings of perhaps 1 per cent of GDP can be realized. This is because electronic payments, depending on the application, are from one-half to two-thirds lower than their alternative paper-based non-cash instruments. Little information exists regarding the cost of a country's payment system despite the fact that such expenses may absorb of 2 to 3 percent of GDP. No time-series of bank-specific or national aggregate data on payment costs are available to determine how a country may have benefited by a shift to low cost electronic payments and expanded use of ATMs.

Humphrey (2009) argued that strong scale economies are associated with bank payment activities as well as with the size of bank ATM and branch office networks. He emphasized that relating bank operating cost to point of sale and bill payment transaction volumes across 11 European countries over 1987-2004 revealed that doubling of payment volumes increased operating expenses by only 27 per cent, so that average payment costs potentially fell by 37 per cent. In an earlier analysis over a shorter period (1987-1999), bank operating expenses at European banks were estimated to be some US Dollar 32 billion lower than they would otherwise have been

due to the realization of payment scale economies, the shift from paper-based to cheaper electronic payments and a corresponding shift away from expensive branch offices to ATMs for cash acquisition. He supported his argument by pointing out that these statistical estimates were supported by the observed fall in the ratio of bank operating costs to asset value in 11 European countries by 34 per cent over the period 1987-2004.

Christine & Wilko (2007) observed that size and scalability are important in payment systems due to their high capital intensities. Electronic payment systems require considerable up-front investments in processing infrastructure, highly-secure telecommunication facilities and data storage, and apply complex operational standards and processes. They concluded that, with high fixed costs, unit costs should fall when payment volumes increase. In particular, innovations in low-cost data storage and real time processing and transmission have considerably lowered the unit costs of making payment over the last two decades.

Humphrey & Vale (2003) estimated how bank average cost was affected by the ongoing shift from expensive paper-based payment instruments to lower cost electronic payment substitutes. They noted that the share of electronic payments in all non-cash transactions increased from 16 per cent in 1987 to 74 per cent in 1998. They associated this shift to the mean yearly reduction in all bank average costs of 1.3 per cent or 13 per cent for the industry over a 12 year period.

Ayuma (2011) observed that adopting e-commerce strategy offers commercial banks a competitive edge over its competitors thereby enhancing performance. She noted that for banks to be effective, efficient, relevant and financially viable, then strategies like e-commerce are inevitable in the banking industry. She concluded by observing that banks that had adopted the e-commerce strategy had over the years recorded improved performance and encouraged banks to move towards adoption of e-commerce strategies in order to survive in the rapidly changing markets.

2.5. Conclusion

The expansion of automated teller machines to supplement and replace expansive branch offices in delivering banking services and the substitution of low cost electronic payments for paper-based transactions have had a big impact in lowering banking operational costs. Available literature reflects that if a country is able to shift from an all paper-based to an all-electronic-based payment system, a considerable degree of annual cost savings relative to GDP can be realized.

Meaningful reduction in operating costs are realized with a relatively large volume of transactions which helps banks realize economies of scale as long as they can work towards eliminating existing redundancies. Considerable time must be allowed for customers to alter their banking habits and adopt greater use of the new delivery channels. Further, it is noted that technological progress facilitates the geographic expansion of the banking industry.

Electronic payment products can act as gateways into the banking system for the unbanked segments which make up as much as 70 per cent of the world's population. In addition, they can offer major opportunities to the banking industry through investment strategies that: enhance integration of banks internal processes, product and distribution methods in order to gain market share, efficiency and risk management; lead to the formation of alliances with technology partners and telecommunications operators in order to create common platforms; and promote diversification into other business areas such as electronic commerce.

In conclusion, the benefits of implementing electronic payments can be summarized as; increased revenue, improved customer satisfaction, cost reduction, increased efficiency, increased level of output, employee satisfaction and motivation and increased market share. However, no specific studies have been carried out to establish the relationship between electronic payments and banking operational costs in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter presents the methodology used in conducting this research and includes the study design, population sample, data collection, and data analysis procedures.

3.2. Research Design

This study was a census study. A census study is the procedure of systemically acquiring and recording information about the members of a given population. It is a complete survey of a population. This research design was chosen because the number of banks involved in the study, is manageable and data to be used in the study was readily available at the Central Bank of Kenya.

3.3. The Population and sample

The target population of the study consisted of all the commercial banks in Kenya which were participants in the Automated Clearing House (ACH), the Real Time Gross Settlement (RTGS) system and the Payment Card Industry as at the end of December 2011. There were 43 commercial banks in Kenya as at this point. The corresponding list is provided for in Appendix II. Since all the relevant data required for this study was available at the Central Bank of Kenya, the entire population was included in the study thus this was a census study. However, since not all banks

participate in the Payment Card Industry, a fewer number of banks was used to investigate this relationship for the Payment Card Industry. This was composed of banks in Kenya that issue payment card products as in Appendix III.

3.4. Data Collection

This study used secondary data obtained from the Central Bank of Kenya's Bank Supervision Department and the National Payments System Division of the Banking Services and Risk Management Department for the period 2006-2011. The study mainly concentrated on the variation of banking operating costs with messages processed through the various payment systems. In particular, three systems were studied including the RTGS, the ACH and the Payment Card Industry (PCI).

3.5. Data Analysis

In order to study the effect of electronic payments on the banking system operational costs in Kenya, the study concentrated on the relationship between total industry operational costs with flows through the various payment systems for the period 2006-2011. The variation in total operating costs across the RTGS, the ACH, and the Payment Card Industry (PCI) over this period was investigated using a trans-log cost function to derive economies of scale. The trans-log function incorporates higher order and interaction terms between the regressors, thus it was able to allow for variation in economies of scale depending on the level of processing volume. The general form of a trans-log function linking Operating Cost (OC) to the volume processed through the system (Q) and including dummy variables for Ownership

Structure (OS) and Time (T) for technological change, and as used by Christine and Wilko was used in this study and is as follows:

$$\ln OC = \alpha_0 + \alpha_1 \ln Q + \alpha_2 (\ln Q) \cdot (\ln Q) + \alpha_3 (OS - T) \dots \dots \dots (1)$$

Where OC = Total Banking Operational Costs, Q = number of transactions processed through the system, OS and T are dummy variables. OS represents the ownership structure of the payment processor such that OS = 0 if ownership is that of the central bank and OS = 1 otherwise. T refers to time in years from 2006-2011 such that T = 1, for 2006 and varies to 6 by end of 2011.

The argument here is that processors that are owned by the national central banks are more heavily subsidized than commercial processors, so that reported cost data only partially reflect true underlying payment processing costs. This means that privately owned processors show higher cost levels compared to central bank owned processors. The resulting simultaneous (linear) restrictions were then solved using regression analysis. To test the significance of the model, correlation coefficient between the dependent variable and the independent variable(s) was used to check whether it is negative or positive.

In addition to the aggregate regression model for each system, the 43 banks were grouped into three categories large, medium and small for the RTGS system and a further regression was carried out to determine any relationship between operating costs and electronic payments.

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1. Introduction

This chapter presents the analysis of the empirical results of the study. The focus is on the relationship between the number of transactions (measured by; the number of messages processed for the RTGS, the number of times a card is used for the ATMs and the number of cheques processed for the ACH) through the various payment systems and the operational costs of commercial banks in Kenya. Overall, this analysis assumed ownership of all the payment systems by the Central Bank of Kenya, although both the ATM network and the ACH are owned by the industry.

4.2. The Real Time Gross Settlement (RTGS) System

All commercial banks in Kenya are members of the Kenya Electronic Payment and Settlement System (KEPSS), Kenya's Real Time Gross Settlement (RTGS) System which facilitates inter-bank dealing business. From the results shown in equation 1 below, Operational Cost seem to decline with an increase in the number of payment messages processed through the RTGS system. This observation is made on the basis of the coefficient of the square of the logarithm of the number of transactions through the RTGS system.

The regression results presented in Table 1 below shows that the adjusted R-squared is 0.986 implying that the model explains over 98.6 per cent of the variations in the

operating costs of commercial banks in Kenya. The results also show that the coefficient on the log of number of transactions (LNRTGS1) through the RTGS is positive and significant at 10 per cent level. The positive coefficient of 1.65 on RTGS implies that operating costs of the commercial banks initially increases with the number of transactions processed by the system. However, due to economies of scale, the operating costs will decrease with the number of transactions. The effect of economies of scale is captured by the square of the log of transactions through the RGTS (LN2RTGS1). The coefficient on LN2RTGS1 is negative and statistically significant at 10 per cent level. This provides evidence that as the number of transactions through the RTGS increases, the operating costs decrease due to economies of scale. This is in line with the economic theory that increasing the production of goods or services results in lower average cost (Varian, 1992). The coefficient on Time (T) is positive but not statistically significant. This, continued usage of the RTGS system improves efficiency of commercial banks thereby lowering operating costs.

TABLE 1: Effects of RTGS on Commercial Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRTGS1	1.652949	0.923431	1.790008	0.2153
LN2RTGS1	-0.059159	0.031558	-1.874613	0.2017
TIME	0.094280	0.096071	0.981361	0.4299
C	-0.443094	6.460993	-0.068580	0.9516
R-squared	0.994413	Mean dependent var		11.28567
Adjusted R-squared	0.986032	S.D. dependent var		0.323502
S.E. of regression	0.038233	Akaike info criterion		-3.455517
Sum squared resid	0.002924	Schwarz criterion		-3.594344
Log likelihood	14.36655	Hannan-Quinn criter.		-4.011253
F-statistic	118.6572	Durbin-Watson stat		3.181563
Prob(F-statistic)	0.008369			

$$\ln OC = -0.443 + 1.653 \ln RTGS1 - 0.0592 (\ln RTGS1) \cdot (\ln RTGS1) + 0.0943 T \dots\dots\dots(1)$$

4.3. The Payment Card Industry System

Commercial banks in Kenya utilize the Payment Card System because of its cost advantage compared to over the counter systems. Most banks charge higher fee for over the counter transactions compared to transactions through the ATMs to discourage customers from using manual systems at counters which are expensive due to higher labour costs. The results of the regression analysis show that the coefficient on the number of times cards are used in ATMS (LNATM1) is positive but not statistically significant. However, the positive effect of the coefficient shows that the operating costs of commercial banks will increase initially because the costs are spread over a small number of ATM transactions. A possible reason for this is the fact that commercial banks do own the ATM networks which implies high cost expenditure to acquire and rollout ATM networks, a situation accompanied by increased labour costs and thus increased operational costs. In addition, payment card usage in Kenya is low as most of the people still rely on cash and cheques for making payments. This situation is even aggravated by the increased use of mobile money transfer services which directly affects the usage of payments cards as mobile payments are complementary services to ATM card usage. However, as the number of transactions increase, the operating costs decreases as shown in Table 2 below. The Table shows that the coefficient of the square of the number of times ATM cards are used in ATMs (LN2ATM) becomes negative (-0.0754) over time. This implies that banks are likely to increase efficiency over time and hence reduce operational cost. This is reflected by the reduction in the operational cost by 7.5 per cent for every 1 per cent increase in volume of transactions.

TABLE 2: Effects of ATMs on Commercial Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNATM1	2.698116	2.760116	0.977537	0.4314
LN2ATM1	-0.075454	0.087283	-0.864475	0.4784
TIME	0.161955	0.184176	0.879351	0.4720
C	-13.36921	22.27020	-0.600319	0.6093
R-squared	0.991371	Mean dependent var	11.28567	
Adjusted R-squared	0.978427	S.D. dependent var	0.323502	
S.E. of regression	0.047515	Akaike info criterion	-3.020827	
Sum squared resid	0.004515	Schwarz criterion	-3.159654	
Log likelihood	13.06248	Hannan-Quinn criter.	-3.576563	
F-statistic	76.59137	Durbin-Watson stat	3.350330	
Prob(F-statistic)	0.012916			

$$\ln OC = -13.369 + 2.698 \ln ATM1 - 0.075 (\ln ATM1)^2 + 0.162T \dots \dots \dots (2)$$

4.4. The Automated Clearing House System

All commercial banks in Kenya participate in the Automated Clearing House (ACH). The results presented in Table 3 below indicate that the operating costs of commercial banks decrease with the increase in the number of cheques processed through the clearing house. This is evidenced by the negative coefficient of LNACH1 (-55.3), although this is not statistically significant. However, with the increase in the number of cheques cleared through the ACH, the operating costs of the commercial banks increase as evidenced by the positive coefficient on the square of the number of cheques processed through the ACH (LN2ACH1). One possible explanation for the positive relation between operating costs and the number of cheques cleared through the ACH is that despite the assumption that all the three systems studied are owned by the Central bank, the clearing house is owned by the industry, in which case banks spend a lot of money to put in place the infrastructure and also to manage it.

TABLE 3: Effects of ACH on Commercial Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNACH1	-55.30008	385.4073	-0.143485	0.8991
LN2ACH1	1.949046	13.61676	0.143136	0.8993
TIME	0.174804	0.020333	8.596950	0.0133
C	402.9225	2727.080	0.147749	0.8961
R-squared	0.984644	Mean dependent var	11.28567	
Adjusted R-squared	0.961610	S.D. dependent var	0.323502	
S.E. of regression	0.063385	Akaike info criterion	-2.444473	
Sum squared resid	0.008035	Schwarz criterion	-2.583300	
Log likelihood	11.33342	Hannan-Quinn criter.	-3.000209	
F-statistic	42.74798	Durbin-Watson stat	1.714061	
Prob(F-statistic)	0.022945			

$$\ln OC = 402.92 - 55.30 \ln ACH1 + 1.949 (\ln ACH1) \cdot (\ln ACH1) + 0.175 T \dots \dots \dots (3)$$

4.5. The Segmented RTGS Data Analysis

In addition to the aggregate regression model for the RTGS, the banking industry was segmented into three broad categories namely; Large, Medium and Small banks. The idea here was to gain an in-depth understanding of the effect of RTGS on the operating costs of the commercial banks. Thus, this was done only for the RTGS system for which data was readily available. Further, in this study, large banks were taken as those which had assets of Ksh 15 billion and above while medium and small banks were those with assets between Ksh 5-15 billion and below Ksh 5 billion respectively.

4.5.1. The RTGS System, Large Banks

Table 4 below, presents the regressions results of the number of transactions through the RTGS for the large commercial banks. Although most of the coefficients are not

statistically significant, the signs are in line with the results presented in Table 1. For instance, the positive coefficient of the log of the number of transactions through the RTGS for these banks (RTGS2) is positive, thus confirming the earlier findings that operating costs of commercial banks may initially increase with increased number of messages processed by the system before the critical mass is attained.

TABLE 4: Effects of RTGS on Large Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRTGS2	0.906335	0.766281	1.182771	0.3585
LN2RTGS2	-0.027235	0.027307	-0.997348	0.4237
TIME	0.053454	0.109906	0.486362	0.6748
C	4.024212	5.096499	0.789603	0.5125
R-squared	0.994869	Mean dependent var	11.11472	
Adjusted R-squared	0.987174	S.D. dependent var	0.372481	
S.E. of regression	0.042185	Akaike info criterion	-3.258787	
Sum squared resid	0.003559	Schwarz criterion	-3.397614	
Log likelihood	13.77636	Hannan-Quinn criter.	-3.814523	
F-statistic	129.2736	Durbin-Watson stat	3.269107	
Prob(F-statistic)	0.007686			

$$\ln OC = 4.024 + 0.906 \ln RTGS2 - 0.027 (\ln RTGS2) \cdot (\ln RTGS2) + 0.053T \dots (4)$$

4.5.2. The RTGS System, Medium Size Banks

The results for medium commercial banks reveal that operational costs of commercial banks decline with increasing number of messages through the RTGS. The coefficient of the square of the log on the number of messages processed through RTGS for these banks (LN2RTGS3) is negative and statistically significant at the 5 per cent level.

TABLE 5: Effects of RTGS on Small Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRTGS3	3.293337	2.029801	1.622492	0.2462
LN2RTGS3	-0.160853	0.074478	-2.159741	0.1634
TIME	0.327814	0.275106	1.191592	0.3557
C	-8.460931	13.19783	-0.641085	0.5871
R-squared	0.878441	Mean dependent var	9.047139	
Adjusted R-squared	0.696103	S.D. dependent var	0.203524	
S.E. of regression	0.112196	Akaike info criterion	-1.302410	
Sum squared resid	0.025176	Schwarz criterion	-1.441237	
Log likelihood	7.907229	Hannan-Quinn criter.	-1.858145	
F-statistic	4.817654	Durbin-Watson stat	3.013551	
Prob(F-statistic)	0.176679			

$$\ln OC = - 8.461 + 3.293 \ln RTGS3 - 0.161 (\ln RTGS3) \cdot (\ln RTGS3) + 0.327T \dots\dots(5)$$

4.5.3. The RTGS System, Small Banks

Similar to Large and Medium size banks, Small banks in Kenya also enjoy economies of scale with increase in the number of messages through the RTGS as shown by the negative coefficient on the number of messages processed through the RTGS. For instance, the coefficient on LN2RTGS4 (i.e. the square of the number of messages processed by the RTGS) is negative and statistically significant at the 5 per cent level (see Table 6 below). This confirms the earlier findings that increased message processing lowers the operating costs of commercial banks as a result of improved efficiency attributed to the RTGS system.

TABLE 6: Effects of RTGS on Small Banks Operational Costs

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNRTGS4	29.69749	12.39217	2.396471	0.1388
LN2RTGS4	-1.382553	0.534966	-2.584375	0.1228
TIME	-0.123805	0.339344	-0.364836	0.7502
C	-150.5771	70.39766	-2.138950	0.1658
R-squared	0.943053	Mean dependent var	8.054919	
Adjusted R-squared	0.857633	S.D. dependent var	0.463356	
S.E. of regression	0.174831	Akaike info criterion	-0.415268	
Sum squared resid	0.061132	Schwarz criterion	-0.554095	
Log likelihood	5.245805	Hannan-Quinn criter.	-0.971004	
F-statistic	11.04018	Durbin-Watson stat	2.439119	
Prob(F-statistic)	0.084192			

$$\ln OC = -150.577 + 29.697 \ln RTGS4 - 1.382 (\ln RTGS4) \cdot (\ln RTGS4) - 0.124T \dots (6)$$

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

In this chapter the conclusions arrived at from the research are discussed in the light of the objective of the study. The objective of the study was to determine the relationship between electronic payments and commercial banks operating costs in Kenya. To achieve this, data for the three key payment systems including the RTGS, the ACH and the Payment Card Industry was obtained from the Central Bank of Kenya for the period 2006-2011 and analyzed. Some interesting findings were established and these could be subject of further studies in this area.

5.2. Summary and Conclusion

The regression results obtained in this analysis indicate that commercial banks operational costs decrease with increased number of transactions through the various Systems. The study found that the independent variables strongly explain the dependent variable as indicated by the high Adjusted R-squared.

The results also reflect that payment system ownership is an important factor in considering the impact of payment systems on commercial banks operational costs. Ownership by the Central Bank implies that commercial banks do not incur large capital outlay in payment system acquisition and installation and can thus only utilize them to leverage on their efficiency in driving costs operations down. Additionally,

the do not need to employ additional man power since these systems require only a few staff.

Unlike all other results, the Adjusted R-squared for the medium commercial banks is rather low. However, despite this, the negative coefficient of square of the log of RTGS transactions for these banks (LN2RTGS3) is statistically significant at 10 per cent level indicating that operating costs decrease with increased number of transactions through the RTGS System.

Overall, where ownership is not by the central bank, commercial banks incur high costs in acquiring and installing ATM networks as well as increased operational costs on recruitment and maintenance of personnel to run these systems. By extension, this leads to increased operational costs which may require higher critical mass volume before attaining any breakeven level.

In conclusion, the results of the analysis indicate that for economies of scale to be achieved in driving operational costs down, who owns the system is an important factor to consider. Systems owned by central banks or outsourced from service providers may help commercial banks leverage on system efficiencies and thus lower operational costs. In addition, a critical or breakeven number of transactions level could be an important factor to consider as a bank cannot lower operational costs unless the volume of payments going through the various systems reaches the critical level.

5.3. Suggestions for Further Study

The analysis results in this research study indicate that payment system ownership and critical (breakeven) mass transaction volume levels may be some of the key factors to be considered by commercial banks while contemplating business strategies that seek to lower operational costs. In this regard, I would suggest the following areas for further studies.

Further studies can be done on the relationship between commercial banks operational costs and payment system ownership. The idea here is that where payment systems are owned by other bodies rather than commercial banks, commercial banks can use these payment systems to increase operational efficiencies and lower operational costs.

Further studies can also be carried out to investigate the relationship between commercial banks operational costs and the number of transactions through the system with an objective of determining the critical (breakeven) mass level.

5.4. Recommendations

Based on the findings it is evident from the RTGS system results that where ownership of the payment system is by the Central Bank, commercial banks are able to leverage on the payment system efficiency to increase flows through the systems and by extension lower operational costs. In view of this therefore, I would recommend commercial banks to move away from proprietary payment system infrastructures to outsourcing of the same from specialized providers. Commercial banks should also take advantage of the payment system's reform and modernization

process and modernize their own payment systems to enhance efficiencies and by extension reduce operational costs.

5.5. Limitations

Data availability was the main challenge in this study. Except for the RTGS system for which data was readily available, all other payment systems lacked data. Thus it was not possible to carry out segmented data analysis for the ACH and the Payment Card system.

There were few relevant MBA projects available for this study. However, few as they were, they indicated that electronic payments increases efficiency, thus leading to a reduction in operational costs.

I had to assume Central Bank ownership for all the three payment systems to simplify the analysis and eliminate the complexity of the model.

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APPENDIX I: LETTER OF INTRODUCTION



UNIVERSITY OF NAIROBI
SCHOOL OF BUSINESS
MBA PROGRAMME

Telephone: 070-2059162
Telegrams: "Vanity", Nairobi
Telex: 27093 Vanity

P.O. Box 30197
Nairobi, Kenya

DATE: 05/09/2012

TO WHOM IT MAY CONCERN

The bearer of this letter: MR. JULIUS K. MUTEKI

Registration No. D61/8375/2006

is a bona fide continuing student in the Master of Business Administration (MBA) degree program in this University.

He/she is required to submit as part of his/her coursework assessment a research project report on a management problem. We would like the students to do their projects on real problems affecting firms in Kenya. We would, therefore, appreciate your assistance to enable him/her collect data in your organization.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.

IMMAMUWA
MBA ADMINISTRATOR
MBA OFFICE, AMBANK HOUSE

**APPENDIX II: List of all Commercial Banks in Kenya as at
December 31st, 2011**

	BANK		
1.	Equity Bank	23.	ABC Bank
2.	Co-operative Bank	24.	Bank of India
3.	Kenya Commercial Bank	25.	Prime Bank
4.	Family Bank	26.	Bank of Baroda
5.	National Bank of Kenya	27.	Credit Bank
6.	Post-bank	28.	Fidelity Bank
7.	Barclays Bank (K) Ltd	29.	Guardian Bank
8.	Standard Chartered Bank	30.	Paramount Bank
9.	CFCStanbic	31.	UBA Bank
10.	K-Rep Bank	32.	Chase Bank
11.	I&M Bank	33.	Dubai Bank
12.	Diamond Trust	34.	Giro Bank
13.	NIC Bank	35.	Middle East Bank
14.	Ecobank	36.	Jamii Bora Bank
15.	Imperial	37.	Citibank
16.	Consolidated	38.	Development Bank
17.	Commercial Bank of Africa	39.	Habib bank
18.	Fina Bank	40.	Oriental Commercial Bank
19.	Gulf African Bank	41.	Housing Finance
20.	Bank of Africa	42.	Victoria Commercial Bank
21.	Transnational Bank	43.	Habib AGZ
22.	Equatorial Bank		

Source: Central Bank of Kenya

**APPENDIX III: List of all Commercial Banks in Kenya Offering
Payment Cards**

	BANK		
1.	Equity Bank	20.	Bank of Africa
2.	Co-operative Bank	21.	Transnational Bank
3.	Kenya Commercial Bank	22.	Equatorial Commercial Bank
4.	Family Bank	23.	ABC Bank
5.	National Bank of Kenya	24.	Bank of India
6.	Post-bank	25.	Prime Bank
7.	Barclays Bank (K) Ltd	26.	Bank of Baroda
8.	Standard Chartered Bank	27.	Credit Bank
9.	CFCStanbic	28.	Fidelity Bank
10.	K-Rep Bank	29.	Guardian Bank
11.	I&M Bank	30.	Paramount Bank
12.	Diamond Trust	31.	UBA Bank
13.	NIC Bank	32.	Chase Bank
14.	Ecobank	33.	Dubai Bank
15.	Imperial Bank	34.	Giro Bank
16.	Consolidated Bank	35.	Middle East Bank
17.	Commercial Bank of Africa	36.	Jamii Bora Bank
18.	Fina Bank	37.	Citibank
19.	Gulf African Bank		

Source: Central Bank of Kenya

APPENDIX IV: Data Capture Form

The form below was used to capture data for the RTG, ACH and the Payment Card as in appendix V.

	AVERAGE OPERATING COSTS (KSH BILLION)	VOLUME ("000")	TIME
2005			
2006			
2007			
2008			
2009			
2010			
2011			

Source: Central Bank of Kenya

**APPENDIX VII: Number of Transactions through Various Systems
and Operating Expenses of Commercial Banks**

Table 1: RTGS NUMBER OF TRANSACTIONS VS OPERATING EXPENSES

	Operating expenses (Ksh million)	Number of transactions through the RTGS	Time
2006	51,065	95,894	1
2007	59,061	137,398	2
2008	78,272	235,880	3
2009	88,442	352,448	4
2010	103,708	818,553	5
2011	118,119	1,170,649	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review

Table 2: NUMBER OF TIMES CARDS ARE USED IN ATMs VS OPERATING EXPENSES

	Operating expenses (Ksh million)	Number of times cards are used via ATMs	Time
2006	51,065	19,387,834	1
2007	59,061	28,652,610	2
2008	78,272	42,344,703	3
2009	88,442	67,886,037	4
2010	103,708	91,213,553	5
2011	118,119	119,137,155	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review

Table 3: NUMBER OF CHEQUES CLEARED VIA ACH VS OPERATING EXPENSES

	Operating expenses (Ksh million)	Number of cheques cleared	Time
2006	51,065	1,295,000	1
2007	59,061	1,412,000	2
2008	78,272	1,353,000	3
2009	88,442	1,492,000	4
2010	103,708	1,369,000	5
2011	118,119	1,430,000	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review

Table 4: RTGS NUMBER OF TRANSACTIONS VS OPERATING EXPENSES, LARGE BANKS

	Operating expenses (Ksh million)	Number of transactions through the RTGS	Time
2006	41,207	38,894	1
2007	47,712	60,584	2
2008	64,188	107,244	3
2009	72,387	169,295	4
2010	93,173	410,613	5
2011	107,738	585,563	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review

Table 5: RTGS NUMBER OF TRANSACTIONS VS OPERATING EXPENSES, MEDIUM BANKS

	Operating expenses (Ksh million)	Number of transactions through the RTGS	Time
2006	6,325	34,120	1
2007	7,440	48,517	2
2008	10,216	93,305	3
2009	10,879	138,583	4
2010	7,978	325,428	5
2011	9,002	482,086	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review

Table 6: RTGS NUMBER OF TRANSACTIONS VS OPERATING EXPENSES, SMALL BANKS

	Operating expenses (Ksh million)	Number of transactions through the RTGS	Time
2006	3,533	22,881	1
2007	3,909	28,298	2
2008	3,869	35,331	3
2009	5,176	44,571	4
2010	2,556	82,512	5
2011	1,380	103,000	6

Source: Central Bank of Kenya, Annual Reports & Monthly Economic Review