

A COMPARATIVE STUDY OF CRITICAL SUCCESS FACTORS (CSFS) IN IMPLEMENTATION OF MOBILE MONEY TRANSFER SERVICES IN KENYA

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ABSTRACT

Mobile Money Transfer is a value addition service (VAS) has proved to be a key component of poverty reduction in Africa. As a result, Mobile Network Operators have strived to communicate to the consumer the significance of Mobile Money Transfer with different Operators presenting different unique offerings, it's true that the Impact on social, economic and political arena is immeasurable. Objectives of this research is to: assess the success ,threats and failure of MPESA(Mobile money by Safaricom Tariff), Airtel Money, Orange Money and Yu Cash in Kenya in the previous years , compare the cost and quality of services , identify the level, awareness knowledge of alternative to the MMT services ,hence determine whether additional Internet Service providers(ISP) needed for competition in this sub sector.The scope is focused to Uasin Gishu County ,in Kenya .

Key words: Mobile Money Transfer (MMT), Mobile Network Operators (MNO), value addition service (VAS), Internet Service providers (ISP) and Information and Communication Technologies (ICTs).

BACKGROUND

M-Pesa (M for mobile, pesa is Swahili for money) is a mobile-phone based money transfer and micro-financing service, launched in 2007 by Vodafone for Safaricom and Vodacom, the largest mobile network operators in Kenya and Tanzania,(Michael, 2012).It has since expanded to Afghanistan, South Africa, India and in 2014 to Eastern Europe. M-Pesa allows users with a national ID card or passport to deposit, withdraw, and transfer money easily with a mobile device. (Michael, 2012).

M-Pesa is operated by Safaricom and Vodacom, mobile network operators (MNO) not classed as deposit-taking institutions, such as a bank. M-Pesa customers can deposit and withdraw money from a network of agents that includes airtime resellers and retail outlets acting as banking agents. The service enables its users to: deposit and withdraw money, transfer money to other users and non-users, pay bills, purchase airtime and transfer money between the services and, in some markets like Kenya, a bank account. A partnership with Kenya-based Equity Bank launched M-KESHO, a product using M-PESA's platform and agent network,that offers expanded banking services like interest-bearing accounts, loans, and insurance. (Vaughan, 2008) Technologies can be said to include a broad array ranging from old technologies such as radio and TV to new ones such as cellular mobile communications, European Commission (2001:3). The EC sums it up adequately by stating that "ICTs are enabling and facilitating technologies. Individuals, community groups, business or government departments with access to affordable communications and

computers can use them to save time and money and improve the quality of their work or home lives", European Commission (2001:3).

Mobile Money Transfer (MMT) is an innovation to transfer money using the Information and Communications Technology (ICT) infrastructure of the Mobile Network Operators (Mbiti, 2011). The MNO infrastructure becomes a channel for funds transfer between customers of one or multiple MNOs to both the cellular terminals or to business organization to pay, procure goods or to a bank account to transact through the account. Where the transfer is cellular phone to cellular phone, this is peer-to-peer or person to person (P2P); in other cases, it could be person to business/bank (P2B) to pay for goods or services or bulk payments e.g., salaries. These definitions are not intended to be exhaustive but as indicative due to the rapid evolution of MMT (Kihara 2010).

This is good news for a country where most citizens, especially in the rural localities, remain largely unbanked due to low literacy levels and poverty. According to Safaricom, its cash Transfer service M-Pesa is its biggest success story. The number of M-Pesa subscribers is more than 14 million subscribers who are served by more than 40,000 agents spread across the country; a brand largely trusted by Safaricom subscribers, the money transfer service allows subscribers not only to send and receive money but also to pay utility bills such as electricity, power and telephone bills. (Collymore, 2013)

Information and Communication Technologies: *Information and Communication*

Technologies (ICTs) differ widely, they do bear some similarities. A fairly authoritative definition of ICTs is provided by The European Commission (2001:3), which states that ICTs include "a wide range of services, applications and technologies, using various types of equipment and software, often running over telecommunications networks." "a wide range of services, applications and technologies, using various types of equipment and software, often running over telecommunications networks." The EC enumerates such technologies "o include well-known telecommunication services such as telephony mobile telephony and fax. Applications include video-conferencing, tele-working, distance learning, management information systems, Executive support system, Accounting System, Enterprise Resource Planning, Office Automated System and Point of Sale Terminal system. Authors like, Sanja (2014) argues that, technologies can be said to include a broad array ranging from old technologies such as radio and TV to new ones such as cellular mobile communications. Sanja (2014), further states that Technologies Networks may comprise of copper or fibre optic cable, wireless or cellular mobile links, and satellite links. That the equipment includes telephone handsets, computers and network elements such as base stations for wireless service. The EC sums it up adequately by stating that "ICTs are enabling and facilitating technologies. Individuals, community groups, business or government departments with access to affordable communications and computers can use them to save time and money and improve the quality of their work or home lives". For instance, Kenney (1995) argues that access to ICTs is dependent on education and income distribution, while Moyo (1996) stresses the inevitability and pervasion of ICT in all sectors of the economy. Some authors, like Chowdhury in Adeya (2002:1), are of the opinion that "the poor cannot eat high-speed Internet", while others like Barlow in Adeya (2002:1) maintain that "Africa should skip industrialism entirely and leap directly into the information era"

Telecommunications

Wireless has become the delivery mode of choice to provide connectivity into poor communities in the global South. Interest in satellite-based forms such as VSAT during the 1980s and 1990s has given way to a focus on land-based transmission systems. In the same way, attention is turning from WiFi-based systems and innovation to WiMAX. (Sanja, 2014) ,the overriding innovation issue remains the relatively low traffic demand and low population density of most areas of rural poverty ; requiring solutions that can deliver broader reach at lower cost than current technology,(Sanja, 2014). However , information can be accessed in seconds by connecting to the internet and surfing through Web pages

Mobile cellular network

Refers to the subscriptions to a public mobile telephone service and provides access to Public Switched Telephone Network (PSTN) using cellular technology, including number of pre-paid SIM cards active during the past three months. This includes both analogue and digital cellular systems (IMT-2000 (Third Generation, 3G) and 4G subscriptions, but excludes mobile broadband subscriptions via data cards or USB modems. Subscriptions to public mobile data services, private trunked(Sanja,2014)

Mobile Cellular Subscriptions: Prepaid

Mobile radio, telepoint or radio paging, and telemetry services should also be excluded. This should include all mobile cellular subscriptions that offer voice communications. Telephony except that it allows ease of use, has much more widespread coverage and also, in the long run, makes cheaper telephony possible. Internet telephony, also again no different in use and enabling possibilities, is set to make telephony all over and across the world extremely economical. Internet radio again provides much greater variety and reach than ever before. Broadband is expected to make TV over the Internet commonplace.

Technologies: Technologies can be said to include a broad array ranging from old technologies such as radio and TV to new ones such as cellular mobile communications. Networks may comprise of copper or fibre optic cable, wireless or cellular mobile links, and satellite links. In the last couple of years mobile technology has flourished throughout the developing world faster than any other technology in history(Loretta micheals,2011) . Software programs are the lifeblood of all these components, the sets of instructions behind everything from operating systems to the Interne."

According to , (Sanja,2014) The emergence of the Internet, evolving customer demands, the pressure to accelerate the business process, and the need to establish more collaborative relationships with key suppliers and business partners are pushing organizations large and small towards the use of an ICT solution. There is a constant need to integrate information systems within core business processes of the enterprise, and of course the introduction of new technologies into the workplace (Kesner, 2008). To prepare and educate managers to lead future organizations, it is imperative not only to teach them conceptual knowledge about integrated business processes, but also to allow them to de-velop hands-on skills in adopting, deploying, and actually using the technologies that drive business process integration.

The Kenyan Mobile Phone Industry is more advanced compared to other countries in the continent. Safaricom is the leading Mobile Network Operator (MNO) in terms of subscriber

market share (64.5% of the total 30.4 Million subscribers) according to the *CCK Sector Statistics for Q2 2013-14*. During the same period Airtel had a 16.9% market share while Orange and Yu Mobile had 8.1% and 10.5% respectively. Additionally mobile telephony penetration was at 78.0 per 100 people (Quarterly Sector Statistic Report Q2 2013-14). According to the Institute of Economic Affairs of Kenya in their report on the State of Competition in Kenya (2011), Kenya's dominant Mobile phone players also dominate the Mobile Money Transfer (MMT) subsector.

Objectives of the research is assess the success ,threats and failure of MPESA, Airtel Money, Orange Money and Yu Cash in Kenya in the last 3 years , to compare the cost and quality of services , identify the level, awareness knowledge of alternative to the MMT services ,hence determine whether additional Service providers needed for competition in this sub sector.The scope is focused to Uasin Gishu County , in Kenya with the most direct economic impact of mobile phones in Africa is job creation (Corbetta, 2008).

The research is concern about the following Questions :What is the level of awareness of alternative MMT Services apart from M PESA as a more cost effective alternative MMT service?, What specific activities resulted in improved MMT transactions and Acquisitions?, What are the possible ways of improving quality of promotional activities that give the best results in the most economical way? And Is the introduction of three additional MMT Services sustainable? Or is one dominant MMT service in the country the way to go?

With an increase in the number of mobile phone operators and greater mobile phone coverage, labour demand within these sectors has increased. For example, formal sector employment in the private transport and communications sector in Kenya rose by 130% between 2003 and 2007 (CCK, 2008), suggesting that mobile phones have contributed to job creation.

Justification

There is need to address the existing gaps such as fluctuation of data capture in real time by some BTS due to weather, power fluctuations, scheduled , unscheduled system shut downs and system errors that may affect accuracy of data., in the quality and focus of MMT Services in Kenya. The study findings will be useful in addressing MMT penetration in the Airtel Money network, Orange Money Network and the other emerging players. A lot of data that has been collected over time by CCK Analysts has certain inherent trends that have already been patterned. With the assistance of these data analysts they will help fill in the gaps in the data. Though most power outages are during the night when little activity is experiences on MMT.

LITERATURE REVIEW

Mobile banking is a powerful tool for economic growth and should be protected from challenges it faces. Safaricom is just one organization that offers mobile money services and therefore this research will not only benefit it but other organizations which offer the same services and other related industries such as the authorities in dealing with these menace. According to Sanja(July,2014), the mobile money services have now predisposed Kenya to a better macroeconomic environment, where the country's Central Bank can better monitor cash in circulation. M-pesa has also become popular for paying utility bills with corporate

including the Nairobi Water and Sewerage Company, Kenya Power, DStv and the City Council of Nairobi enlisting its services for payment of bills due to its convenience.

Systems Theory and Mobile Money Transfer

System Theory, first proposed by Ludwig von Bertalanffy in 1945 has been used for decades as an analytical approach to understand how complex physical, biological, economic and social systems operate. A system may be, typically defined as a set of several independent and regularly interacting or interrelating units or subsystems that work together to accomplish a set of pre-determined objectives (Lomerson , 2007). Thus, system theory provides a framework for identifying the subject entity, creating a formalized model of the entity and thereby enabling the ability to study the entity by which groups of elements and their properties may be studied jointly in order to understand results, (Lomerson , 2007).

Telecommunication companies (safaricom, telcom-keny, Airtel, Yu and financial institutions) also have interests in making this experiment prosper. Issuing e-money, utilizing system theory, for one, can be seen as a strategy for telecommunication companies to keep churn rates low and retain customer loyalty (Wishart 2006, Bangens & Soderberg 2008). It can provide them with new potential customers, added sources of revenues (e.g. transaction fees, share of foreign exchange spread, service sign-up fees, etc), and help increase their average revenue per user (ARPU). For financial institutions, mobile banking and mobile money can help increase banking penetration, develop customer loyalty, reduce operational costs, meet government service obligations, etc. (GSMA, 2008a, Wishart2006). Communication tariffs and their behavior have often been investigated using what is termed as ‘system’s approach’. The basic advantage of the system approach is that it encompasses many concepts of system theory such as inputs, outputs, boundaries, feedback and control, etc. that are useful in understanding business situations, specifically with MMT .Mobile Money Transfer(MMT), being a sub system uses appropriate information practices in order to achieve customer acquisition, customer loyalty(Mpesa subscribers), cost savings channel optimization and value capture (Epstein, 2004). The system dependent uncertainty may arise either from the open technological infrastructures or from the transaction specific characteristics of the trading(safaricom , telcom-keny, Airtel ,Yu) parties (Grabner-Krauter S., 2003). The risks associated with the system-dependent uncertainty enhance the role of trust in the Money transactions carried out in online (virtual) environments (Grabner-Krauter S. et al., 2003). Thus, system theory may be applied to understand the issue of trust in Mobile Money Transfer, (Epstein, 2004).

Mobile Money Transfer (MMT) And Cultural theories

Cultural theories from Hofstede and Hall have been used to explore the influence of national culture. Hofstede (2001) defines culture as a collective programming of mind that differentiates members of one group from other. Hall (1976) sees culture as a screen which lies between a person and his environment and enables him to decide what is more important for him. In this research, Hofstede’s configuration is used since it is a well-tested and known theory. Hofstede’s configuration of cultural dimensions consists of four main elements of culture—power distance, individualism vs. collectivism, masculinity vs. femininity, and uncertainty avoidance—with each country scored on a scale of 0 to 100, relative to comparisons in the sample. Uncertainty Avoidance refers to how uncomfortable people feel during an imprecise and uncertain situation (Yeniyurt and Townsend, 2003).

In high Uncertainty Avoidance cultures, organisations have the characteristics of resistance to new technology, such as Mobile Money Transfer (MMT) and not taking potential risks about technology (Hofstede, 2001). This resistance can also be found at individual level, where people show their dissatisfaction with new technology (Mobile money transfer) because of getting used to doing things by the traditional way of money transaction means (Shore & Venkatachalam, 1996). Uncertainty Avoidance Index (UAI) measures the extent to which members of a society accept ambiguity and uncertainty.

Countries with a high UAI score tend to maintain rigid codes of conduct and belief, and are less likely to be tolerant of unorthodox behaviour or ideas. They prefer to let rules and laws govern society, as there is less tolerance for the uncertainty that the future brings. UAI is based on :How often nervousness or tension is felt in the workplace; - whether the organisation's rules should be followed, even when doing so is not in the company's best interest (Chang, 2012).

Culture in this sense is a system of collectively held values. Looking at culture from this angle, culture differs across continents, nations and ethnic groups. According to Smith (2010), culture affects how people observe, interpret, perceive, and react to the world around them. The business models, including operating processes underlying most Mobile Money Transfer software packages used in Southern Africa reflect the UK and American industry practices and culture. Such operating processes are what we implement as a one size fits all when implementing MMT. It is most likely Smith (2010).The Impact on social, economic and political wellbeing of Kenyan MMT services is immeasurable. In the past ten years a vibrant economy has been built around MMT services including Agents, Aggregators, and Banking Services Providers creating direct employment to 2 Million people (James Anyanzwa and Angela Owino, 2014).

There is only one dominant service provider who accounts for 80% of all MMT services in Kenya, yet there are a total of four MMTs in the Country with others receiving licences from the regulator in the very recent past. The problem is what happened to the other three? What impact has it had on their subscriber base? What is the future of these MMTs in the wake of competition and hostile takeovers from more powerful competitors? Is Kenya ready for three additional MMT Service Providers?

Mobile Money Transfer (MMT) is an innovation to transfer money using the Information and Communications Technology (ICT) infrastructure of the Mobile Network Operators (Mbiti 2011). The MNO infrastructure becomes a channel for funds transfer between customers of one or multiple MNOs to both the cellular terminals or to business organization to pay, procure goods or to a bank account to transact through the account. Where the transfer is from mobile phone to mobile phone, it is termed as peer to peer or person to person (P2P); the transaction from mobile phone to the bank or a business is termed as person to business (P2B) to pay for goods or services or bulk payments e.g., wages (Mbiti *et al* 2012). These definitions are not intended to be exhaustive but as indicative due to the rapid evolution of MMT.

The theory of process in Driving Mobile Money Transfer in Business Process Management

A process theory approach, (Markus.2000), is used in this research to understand the importance of the different critical success factors for online systems, a projects in this case the Mobile Money Transfer implementations and upgrades. This theory organizes the series

of events that lead to a online system (Mobile Money Transfer success), (Markus.2000): chartering, project, shakedown, and onward and upward- The chartering phase focuses on the business case for the Mobile Money Transfer and identifying the solutions constraints. The Mobile Money Transfer comprises of services propelled by online system configuration and rollout where the system is integrated with other communication tariffs in the business arena. The system performance in terms of onward and upward to enhancement of the Mobile Money Transfer and its relevant business processes to fit the evolving business needs (Mpesa and its services: Billing ,E-cash etc).

Telkom, a formerly state-owned monopoly and the owner and operator of South Africa's telephone network, was privatized between 1997 and 2003. Despite enjoying an advanced network backbone, Telkom does not offer basic telephone service to a majority of South Africans. Because it depends on revenues from phone calls, Telkom has little incentive to offer cheap VoIP service. South African law dictates that only Telkom and "under-serviced area licensees" (small firms in rural areas) are allowed to offer VoIP, yet the government has not approved a single under-serviced area licensee. So today, for a variety of regulatory reasons, only Telkom can provide VoIP. For competitive reasons, it does not.

Business process management is a stage of business orientation evolution (Weske, 2007). This evolution began with the first wave – continuous process improvement – passed through the second wave – business process reengineering – then the third wave – BPM (Smith, & Fingar, 2003) and finally achieved the fourth wave of business automation – process-based competition (Fingar, 2012).BPM is a collection of concepts, methods, and techniques to support the administration, configuration, and analysis of business processes (Rudden, 2007; Smith & Fingar, 2003; Weske, 2007; Zari, 1997). It is also defined that BPM is the management of cross organizational processes by gathering all sorts of methods, techniques, design tools, and analyses of operational business processes involving humans, organizations, IT, documents, and other sources of information (Aalst, Hofstede & Weske, 2003).

BPM might be perceived as organization's attempts of enhancing basic activities, i.e., manufacturing, marketing, communications, and other aspects of its operations (Trkman, 2010). And nearly 70 per cent of the world's websites are in English, at times crowding out local voices and views. Moreover, their implementation results in reducing cost and time cycle and in improving productivity, quality, and customer service benefits (Shang & Seddon, 2002). MMT capability is expected to result in :business process efficiency (by reducing cost and time cycle, increasing productivity of the production process, and improving quality and customer service); effectiveness (by improving decision making and planning, and resource management and delivery); and flexibility (by building flexibility into IT infrastructure to reduce IT cost, by differentiating products and services, and by establishing and maintaining external linkages to customers and suppliers) (Karimi, Somers, & Bhattacharjee, 2007).

Looking for ways to increase efficiency, reduce costs, improve product quality, and increase customer satisfaction and shareholder value, organizations have realized that the source of success in this area lies in the performance of their processes. It turned out that it is not enough to look at an organization in terms of its functional structure, but also as a network of interrelated business processes. This led to the formulation of new management concepts, such as business process orientation (BPO) (Cieśliński, 2011; McCormack & Johnson, 2001), process-based organizations (PO) (Hernaus, 2008; Levi, 2002; Seltsikas, 2001)

Agency theory and Mobile Money Transfer (MMT)

Agency theory addresses the effect of incentives on the behaviour of individuals in an company ,business enterprises ,institution in terms of the implied contractual relationships between principal(Communication Tariff : Safaricom,Tellcom,Yu,Airtel,MTN,Mango and agent,(Mpesa-agents, banking institutions), (Baiman, S & Eisenhardt,K,1989:1990).The design of an imperfect incentive structure provides the agent with a motive to shirk his effort because such a structure lets his own economic interest diverge from that of the Principal. An appropriate reward structure significantly reduces the conflicts of self-interest between principal and agent and helps to curb agent opportunism (Bryson, K. 2002). Incentive structures in outsourcing contracts help to align the motives of the agents and the principals to facilitate project success. A well-designed incentive structure with a balance between penalties and rewards predicts increased desire on the agent's part to meet the terms of the contract. It also predicts agent behaviour that is consistent with the principal's best interest (Bryson, K. 2002). As such Communication Tariff, will find it difficult to retain their market share of customers .Customers will, sooner or later demand services, offered by other Communication Tariff , (Murphy, 2004). Vitale (2000).Our research finds ,Agency theory vital in that ,the more the principal (Communication Tariffs) relies on the agent for success, the more the Communication Tariff management needs to monitor the performance of the agents,(Mpesa-agents, banking institutions). Greater monitoring/management interventions are presumed to produce better expected Mobile Money transfer outcomes (Might and Fischer, 1985).Agency theory will help Communication Tariffs to manage their relationships during the implementation process, and thus help them enhance the probability of Mobile Money transfer success (Might and Fischer, 1985).

Social Construction of Technology (SCOT) Theory and Mobile Money Transfer

Social construction of technology (also referred to as SCOT) theory draws on the work done by researchers belonging to school of the sociology of scientific knowledge (Thomas P. Hughes, Wiebe Bijker and Trevor Pinch,2004). This theory advocates that human action influences technology, our research advocates that Mobile Money Transfer will be influenced by human action, hence it influences communication tariffs. According to this theory, science and technology are socially constructed sub-cultures and the boundaries between them are the product of social negotiations. It argues that the process of adoption or rejection of a technology (in this case communication tariffs, cannot be understood without understanding how that technology is embedded in its social context. This theory is based on the premise that technologies emerge from social interactions among social groups and actors .According to SCOT, there are no 'best' or 'worst' technologies, as all technologies can be Shaped differently according to the users need.

BENEFITS OF MOBILE MONEY TRANSFER TO MOBILE NETWORK OPERATORS

In a MNO-led model; the banking sector has seen the MNO infrastructure with its near ubiquitous coverage as an exciting opportunity to extend their reach to the unbanked.In the bank-led model, typically, the bank will use all types of ICT infrastructure to reach out to the customers(Mbiti *et al* ,2012). This system has been christened Agency Banking. Other platforms include SMS, internet and Voice. Hence ,Specific benefits to MNOs include:New customer acquisition (individual or corporate)- Non-traditional Telco revenues.- Transaction fees.- Share of forex spread for international MMT-Finders/consumer sign-up fees- M-

banking revenue (e.g., utility bill payments)- Increase in Average Revenue Per User (ARPU)- Reduced churn (e.g., one operator reduced churn from 3% to 0.5% per month)- Meets government service obligations and Corporate Social Responsibility agendas.- Opportunity to up-sell (e.g., mobile content, prepaid to post-paid).

THE VALUE PROPOSITION FOR MOBILE MONEY TRANSFER FOR BANKS

Both the MNOs and banks have shortcomings: MNO does not have expertise in banking and in most cases is not allowed to undertake banking business; on the other hand, the reach out costs to the rural areas by banks is very expensive. This has spawned a model that brings the two to cooperate - MNO bank mode otherwise known as Agency Banking(Omwansa, 2012). Therefore banks especially in Kenya have significantly increased their usage of Mobile Banking platforms in their banking transactions(James Anyanzwa and Angela Owino, 2014).However the value proposition for mobile money transfer for banks are summerised below:

1. Increases banking penetration/untapped market at low acquisition cost.
2. Increases 'stickiness' of current customers.
3. Reduces operational costs with “straight through processing”.
4. Meets government service obligations.
5. Increased productiveness in the remittance service.
6. Opportunity to up-sell remittance to banking products (e.g., mortgages, loans, insurance, pensions).
7. Potential revenue streams (e.g., retention of deposits, increased transaction and foreign exchange spread revenues in case of foreign remittances) GSMA (2008).

All the foregoing platforms are driven by large MNOs or banks in their respective markets to gain a competitive advantage. Thus, typically, the actors will exclude other smaller MNOs or banks in the market. This augments the ever growing problem of exclusivity(Institute of Economic Affairs 2011).

This exclusion calls for third party intervention of the MMT market(with emerging providers like *MobiCash, Paypal*, This intervention can bethrough (i) technology intervention - vendors with platforms that all actors can use or (ii) policy intervention – initiative by national payment authority (there is a demand for interoperability across platforms or getting a third party to own the payment platform) (Institute of Economic Affairs 2011).

The evolution of the platforms has been shaped by the regulatory environment in the banking sectorand, to some extent, ICT sector. Where banking regulations do not allow MNO to undertake MMT, only bank-led models exist. These drive the MMT to using an MNO as a bearer and infrastructure.In cases where MNOs want to enter the MMT market they have typically bought a bank e.g.,Telenor Pakistan. MNO-led MMT have evolved where banking regulations do not forbid MNO in funds transfer business(James Anyanzwa and Angela Owino, 2014).

In an MNO-led model, the MNO owns and control the MMT agents' networks and recruits the user and will only link with the bank to manage cash conversion to e-value(*Kenya Bankers Assorciation: SOPs for setting up Agency Banking in Kenya*). In Kenya, as is noted later in this report, the bank hosts a trustee account. In a bank-led model, the bank recruits the customers who are typically its own account holders or new ones and uses the MNO

infrastructure to reach out to its customers. A partnership combines the expertise of the two. M-KESHO, as is noted, is such a partnership(www.kba.co.ke). Sixty percent of Kenyans now use their phones for financial and banking transactions. And over Ksh. 2Billion change hands through mobile phones everyday(James Anyanzwa and Angela Owino,2014).

Globally, the MMT is evolving very fast, and is huge. According to a Gartner study cited by Alberto of IBM Mobile Banking, there will be 190 million MMT users by 2012 with 87% in developing countries. To capture this market, almost all MNOs in Africa, for example, have introduced or are introducing MMT products. Like Safaricom has M Kopa, M Shwari Account in collaboration with CBA Bank(www.safaricom.co.ke).MMT provides value to the MNO and the banks. According to the GSM Association (GSMA), the MNO operator has a direct and indirect source of value. Direct value is generated from transaction fees from MMT operations and increased telecoms usage to support the service. Indirect value comes from increased usage not directly linked to the service but catalysed by it, for example calls to notify customers that funds are being sent, or from reduced churn (GSMA, 2008).

THE INTERNET AS AN INFRASTRUCTURE TO MOBILE MONEY TRANSFER FOR BANKS

This infrastructure includes existing and evolving Internet and network developments. It will offer specific object-identification, sensor and connection capability as the basis for development of independent federated services and applications. These will be characterized by a high degree of autonomous data capture, event transfer, network connectivity and interoperability”.

The basic concept of the internet of things is the pervasive presence around a variety of things or objects such as radio frequency identifiers (RFID), tags, sensors, actuators, mobile phones, etc.– which are able to interact with each other and cooperate with their neighbours to reach common goals (Atzori, 2010). CASAGRAS defines the IoT as (Casagras, 2011): “A global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communication capabilities.

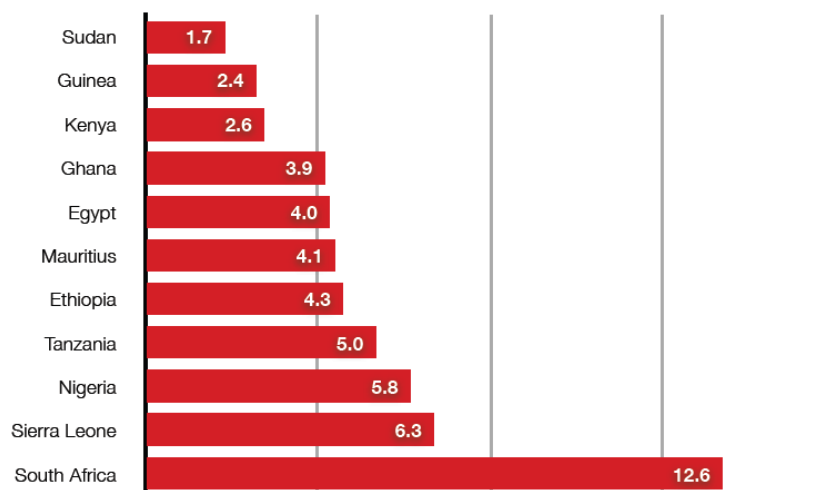
INFORMATION COMMUNICATION TECHNOLOGY AS AN INFRASTRUCTURE FOR MOBILE MONEY TRANSFER FOR BANKS

The following are examples on the applications of ICT in real life. The ICT has many applications in the health sector. These may include wearable staff support systems to locate both doctor and education in a hospital at any point in time. It may also include IoT-based knowledge systems to detect adverse reaction to drugs in patients. The combination of sensors, Wi-Fi, and other technologies come handy in the monitoring of vital functions of the body such as The technologies that support the IoT are what we are traditionally familiar with. These technologies include wireless sensor networks, robotics, vision recognition, smart tags, microcontrollers, mobile devices, near-field communications (NFC), radio frequency identifiers (RFID), bar codes, social networks, ICT global networks, Wi-Fi, cloud computing, CoAP, 6LowPAN, geographic information systems (GIS), GPRS, actuators and satellite technologies, to name but a few. It is essential that Learning Institutions, specifically primary schools create an environment for their schools in which creativity is valued by utilizing internet. In fact, successful ICT reengineering and internet as a driver requires an environment Innovation Strategy Model ment that can foster creativity (Amabile, Conti, Coon, Lazenby, & Heron, 1996; nCooper, 2000).

MOBILE PHONE TRARIFF AS AN INFRASTRUCURE FOR MOBILE MONEY TRANSFER FOR BANKS

Consider the mobile Tariffs in the diagram(1), Internet to drive mobile money transfer .As recorded by RIA pricing Transparency Index ,Kenya as a country compared with South Africa and any other African countries in terms of the OECD 2010 low-user prepaid mobile basket, South Africa is seven times more expensive than the cheapest country (Sudan) surveyed by RIA in Africa and twice as expensive as Sierra Leone, which is only the 10th cheapest country in the RIA Pricing Transparency Index: Prepaid Mobile. This comparison with other African countries studied by RIA shows that although the enforced reduction of MTRs, and price pressures, have brought about a reduction of tariffs, South Africa's prepaid prices continue to be very expensive in comparison to many other African Countries(Sanja M.2013).

(Figure 1)



Source: RIA Pricing Transparency Index: Prepaid Mobile data

PREPAID MOBILE COSTS AND ITS INFLUENCES ON MOBILE MONEY TRANSFER

In diagram2 below , South Africa comes 23rd out of 46 operators measured across Africa in the RIA Prepaid Mobile Price Index in terms of the cheapest prepaid mobile product in the country and 26th in terms of the cheapest prepaid mobile product in the country from a dominant operator

(Figure2)

Table 6: March 2013 prepaid mobile costs based on OECD lower-user basket of 2010					
	Cheapest product from dominant operator		Cheapest product in country		% cheaper than dominant
	US\$	Rank	US\$	Rank	
Ghana	3.9	1	3.9	4	Dominant is cheapest
Egypt	4.01	2	4.01	5	Dominant is cheapest
Mauritius	4.13	3	4.13	6	Dominant is cheapest
Ethiopia	4.3	4	4.3	7	N/A
Kenya	4.37	5	2.58	3	41.0%
Sudan	4.56	6	1.72	1	62.3%
Guinea	6.26	7	2.41	2	61.5%
Tunisia	6.36	8	6.36	12	Dominant is cheapest
Algeria	6.48	9	6.48	14	Dominant is cheapest
Libya	6.88	10	6.88	16	Dominant is cheapest
Congo Brazzaville	7.82	11	7.82	17	Dominant is cheapest
Tanzania	8.32	12	5.01	8	39.8%
Uganda	9.17	13	6.32	11	31.1%
Rwanda	9.19	14	6.37	13	30.7%
Nigeria	9.48	15	5.77	9	39.1%
Namibia	12.2	16	12.2	19	Dominant is cheapest
Mauritania	12.33	17	12.33	20	Dominant is cheapest
Liberia	12.4	18	12.4	21	Dominant is cheapest
Cote d'Ivoire	12.75	19	12.75	24	Dominant is cheapest
Senegal	12.76	20	12.76	25	Dominant is cheapest
Benin	13.16	21	12.45	22	5.4%
Central African Republic	13.16	22	13.16	26	Dominant is cheapest
Sierra Leone	13.59	23	6.28	10	53.8%
Mozambique	14.02	24	14.02	28	Dominant is cheapest
Botswana	14.66	25	11.75	18	19.8%
South Africa	14.91	26	12.57	23	15.7%
Burkina Faso	14.95	27	14.72	29	1.5%
Mali	14.97	28	14.97	30	Dominant is cheapest
Togo	15.52	29	15.52	31	Dominant is cheapest
Chad	16.8	30	16.8	34	Dominant is cheapest
Malawi	16.91	31	16.91	35	Dominant is cheapest
D.R. Congo	17.1	32	17.1	36	Dominant is cheapest
Cameroon	17.32	33	17.13	37	1.1%
Seychelles	18.13	34	18.13	38	Dominant is cheapest
Zambia	19.07	35	18.57	39	2.6%
Niger	19.35	36	16.34	32	15.6%
Angola	22.55	37	19.41	41	13.9%
Zimbabwe	22.75	38	21.57	43	5.2%
Morocco	22.92	39	22.92	44	Dominant is cheapest
Madagascar	23.06	40	19.63	42	14.9%
Lesotho	23.74	41	19.28	40	18.8%
Swaziland	26.01	42	26.01	45	Dominant is cheapest
Cape Verde	29.82	43	29.82	46	Dominant is cheapest

Source: RIA Pricing Transparency Index: Prepaid Mobile data 2013

From analyses of prepaid and postpaid mobile and ADSL (fixed) broadband RIA price categories, it is clear that fixed-line packages are (surprisingly) far more expensive than comparable mobile packages, such can help to drive education sector . Also boosting mobile data's appeal compared to fixed in South Africa, particularly for low data use and uneven consumption, are mobile data's lower setup costs (e.g. no monthly line rental charges and installation fees) and its more convenient prepaid charging options .Its true that mobile broadband that purely traces its data bank from the computer, can boost the teacher to child

delivery as such mobile platform will support smart board functionality ,primary school Head teacher supervision through twitter , skype to the management of school functionality.

MOBILE MONEY TRANSFER IN KENYA

Kenyan microfinance institutions (MFI) and insurance companies are increasingly using M-Pesa for cash disbursement and repayment; businesses, government and NGOs are using it for cash transfers, procurement and salary payments(CCK, 2013). Merchants are also using it for purchases, both for its convenience as well as itscheaper fee structure (M-Pesa charges 1.5% to the merchant, versus 3-4% on the part of most credit cards). In addition, according to a survey carried out by Kenya Bankers Assorciation in the last quarter of 2013, 95% of Kenyans consider mobile banking cheaper, faster and more reliable than normal banking services(Centre for Research of Financial Markets and Policy, 2014).

The value proposition for use of M-Pesa by organizations focuses on a number of benefits, including reduction of cash “leakage” and corruption; increased operating efficiencies, including less paperwork; better transparency and accountability via the electronic records, and more independence and selfsufficiency for users(Katy Gabel, 2008). In terms of quantitative measures, organizational users of mobile money are reporting reduced cost of cash disbursement compared to other current options, such as cost of cash handling and associated security,reduced staff costs and better utilization of staff(Finacess 2009).

SAFARICOM AND M-PESA

M-Pesa as an MMT was launched early 2007 by Safaricom, the largest MNO in Kenya in terms of Market share and established itself quickly as an accepted M-banking operator by reaching 300 000 customers within three months(Micheal Joseph,2009). There were 1.6 million subscribers already in February 2008, attained within only 12 months of operation (Safaricom Press Release, March 2008).

The M-Pesa offer is unique in the sense that no bank account is needed; the customer gets an M-Pesa account instead. The main reason why M-Pesa was an instant success is depicted from the graphical representation below based in Finacess National Survey carried out in 2006.Only 19% of Kenyans have bank accounts but many more have access to a mobile phone & the gap is widening). Of the 29 million Safaricom subscribers, more than 70% (20.5 million users) are subscribed to mobile money, transferring more than Kshs. 176 Billion (2 Billion USD) between October and December 2011. (www.safaricom.co.ke) M-Pesa processes transactions worth US\$4.98 billion annually, translating to 17% of Kenya’s Gross Domestic Product (GDP) (Loretta Micheals, 2011). The success of Mobile Money in Kenya has been attributed to the fact that it has provided the much needed financial facilities to a large number of the country’s unbanked population. There are 25 banks in the M-PESA network with coverage of 700+ ATMs where safaricom MMT subscribers can also withdraw thier money apart from 18,000 M-Pesa Agents. Additionally, through Western Union, subscribers can now receive money on M-Pesa from over 70 countries worldwide (Aker and Mbiti, 2012). There is evidence of concurrent growth of Micro Finance Institutions and Mobile Money Transfer(Loretta Micheals,2011).

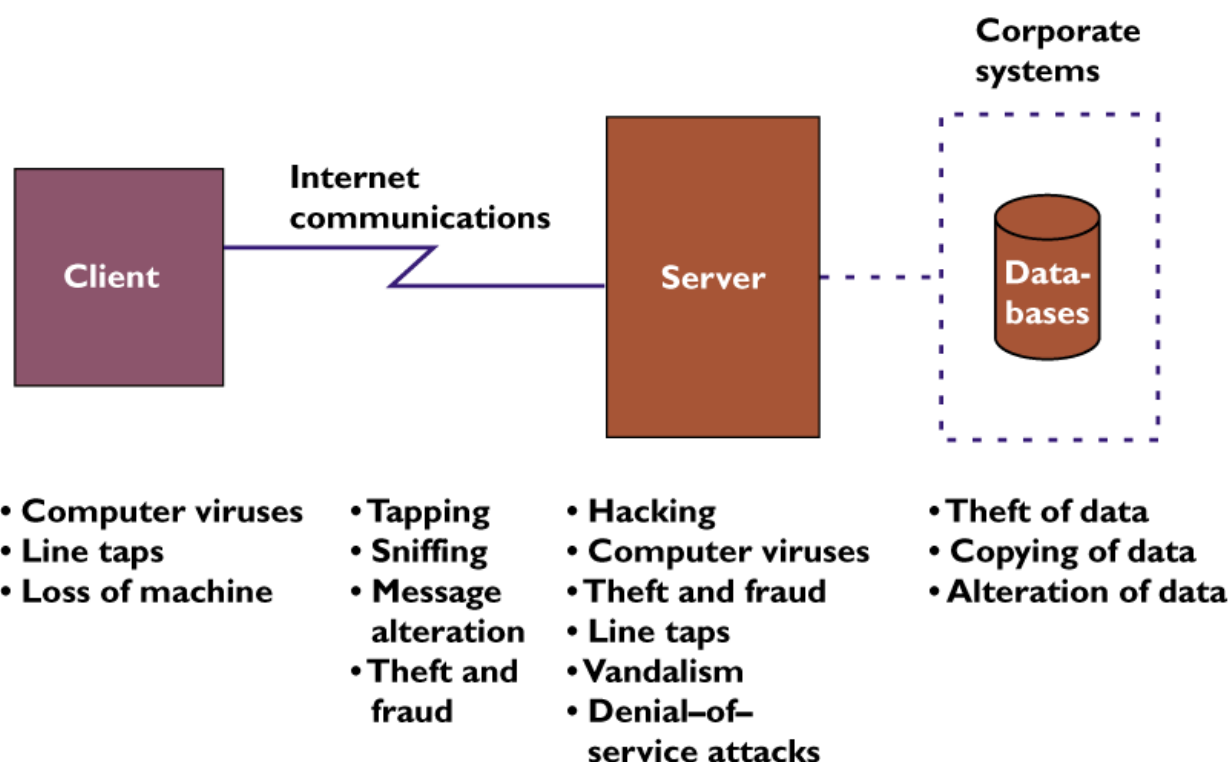
HINDERENCES TOWARDS SECURE ON MOBILE BANKING

Security issues over the internet as a hinderence to mobile money transfer

A majority of the attacks against web servers are through network firewalls and through the http (hypertext transfer protocol)(80) or https (443) ports(Jon,2011). Some of the most commonly used hacking techniques include denial of service, leakage, cross-site scripting, SQL (structured query language) injection and disclosure (Jon, 2011).

Security is the biggest factor slowing down the growth of ecommerce worldwide issue of computer and data security is the biggest hurdle in the growth of mobile money transfer. Web servers also face this security threat. Programs that run on a server have the potential to damage databases, abnormally terminate server software or make changes in the information placed there. A number of international organizations have been formed to share information and combat security threats to computers and computer networks (Jon. P,2011).

Figure3 : Attacks on Mobile Money transfer



Source: From William Stallings – Cryptography and Network Security, 5th Edition

Back doors and Trojan horses: X Back Doors are those hostile programs which, when run on a machine, install hidden services in order to give attackers remote access capabilities to a compromised machine. Trojan horses are those programs that appear harmless but actually have some malicious purpose. Trojan horse has been used to refer to a huge wooden horse where the whole Greek army was hidden during a war and the enemy was deceived because it could not figure out that. For example, HAPPY99.EXE is a Trojan horse that displays a firework and then sends copies of it to the email addresses found on the system.

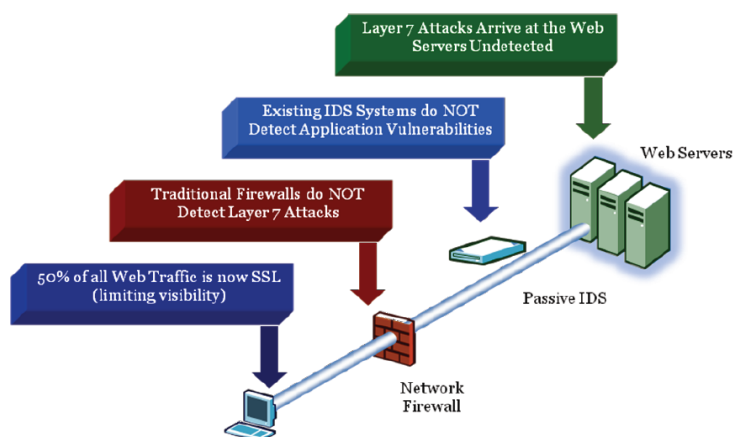
Viruses and worms: Viruses and Worms are malicious programs that can travel between computers as attachments on email or independently over a network. These terms are

sometimes used interchangeably; however, essentially they are different Worms spread from computer to computer, but unlike viruses have the capability to travel without any help or human action .A worm can replicate itself which means that it can send copies of itself to everyone listed in the email address box on a system. Viruses, on the other hand, need to be activated through a human action. Another difference is that viruses modify existing programs on a computer unlike worms which can install back doors or drop viruses on the system they visit. However, this research proposes the installation of antivirus software and continues systems updates such as: McAfee, Norton, Kaspersky, Avira Symantec etc. Downloading of plugins from the internet be avoided (plugins are those programs that work with the, browser to enhance its capabilities ,Downloading of plugins should be done from the vendor's official website Newly obtained disks, programs or files should be scanned for viruses before use, Installation of a firewall may also reduce the risk of virus attack.

Hackers: Hackers are those individuals who write programs or manipulate technologies to gain unauthorized access to computers and networks or diverge data or direct computers and networks to unauthorized access .sometimes malicious Active Content delivered through web pages can reveal credit card nos, mobile phone numbers, user names, passwords and any other information stored in the cookie files on a system. Applets, JavaScript and Active X Controls can be used to install hidden services to the hacker. Some malicious content can be sent by the hacker embedded in the Applet. Through JavaScript attacks a hacker can destroy the hard disk which in turn will affect the mobile receiving end.

Traditional firewalls do not detect Level 7 attacks(Jon,2011), If the traffic is encrypted, there's basically an encrypted tunnel going right through the firewall, passing any and all traffic. The existing IDS systems, for example, that may sniff the wire for bad or malicious traffic, cannot do their job if the traffic is encrypted(Jon ,2011). For the most part, Layer 7 attacks can arrive directly at the web server undetected. The hackers may begin targeting a particular web application and domain to obtain more information. In most cases by running targeted scripts to look at operating systems, application versions, open ports, servers for mobile phone tariffs, such comes back from the server in terms of responses. When the hackers have enough information to execute an attack, they will execute by structured query language (SQL) Injection, cross site scripting, or some other method(Jon ,2011). The end goal is obviously to exploit (i.e., to get , ATM number, credit card numbers, financial data, credentials ,smart card number, mobile phone number, Mpesa number and financial data)

Figure 4.



Source: <http://unixwiz.net/techtips/iguide-ipsec.html>

Eavesdropping/sniffing/snooping: In this type of attack the hacker has the ability to monitor network traffic using some kind of network monitoring software. For example, a hacker may install some backdoor or Trojan horse that can monitor the key strokes of a user while typing and send the typed information to the hacker.

Password attacks: Such attacks are basically a result of eavesdropping through which the hacker is able to know the account ID or password of a particular user. Then using it the hacker gains access to the network and gather information such as user names, passwords, computer names, resources etc. That can lead to modification, deletion or rerouting of network data.

IP address spoofing: It is possible that a hacker (having special capabilities) seizes the control of a router, changes the IP address of the source/sender on data packets and thus forces the destination machine to send the information/web page to a different machine, that is, the machine of the hacker. This is called IP address spoofing.

Man in the middle attacks: In such a case the attacker is able to monitor, capture and control data between sending and receiving machines. Man in the middle attack may apply IP address spoofing technique to divert the packets to its machine, then modify the packets and resend the misleading information to the actual client. Sometimes the hacker is able to substitute the IP address of a genuine web site with the IP address of his own web site due to some security hole in the software that runs on a domain name server. A client would think that he is communicating or receiving the information form a genuine web site, though it would not be the case actually.

PROTECTION AGAINST ATTACKS TO SECURE MOBILE MONEY TRANSFER

Firewalls:This research considers the firewall as one of the best remedy to save guard outside attacks on Mobile money transfer transaction. Firewall is a combination of hardware and software that sits between the internet and internal network of an organization to protect the network from outside attack (Fig. 4). It can examine the data entering or leaving from the network and can filter the data according to certain rules, thus, protects the network from an attack. This research considers four main types of Packet filter firewalls.i.e Packet filter firewall, Circuit level firewall , Application gateway firewall , Sreened host firewall and Cryptography

Application gateway firewall: It operates at application layer of the OSI Model. It uses strong user authentication to verify identity of a host attempting to connect to the network using application layer protocols such us FTP (File transfer Protocal). In contrast to packet filter firewall, it filters the requests rather than packets entering/leaving the network. It can block any outgoing HTTP (Hyper Text transfer Protocal) or FTP requests. It can prevent employees (in the Mpesa, banking centers of a company inside a firewall from downloading potentially dangerous programs from the outside. In other words, this type of firewall is used to control connections thus employees of a company can be restricted from connecting to certain web sites. This research considers the following Figure : 5 Firewall ,proxy server and DMZ(Demilitarized Zone)

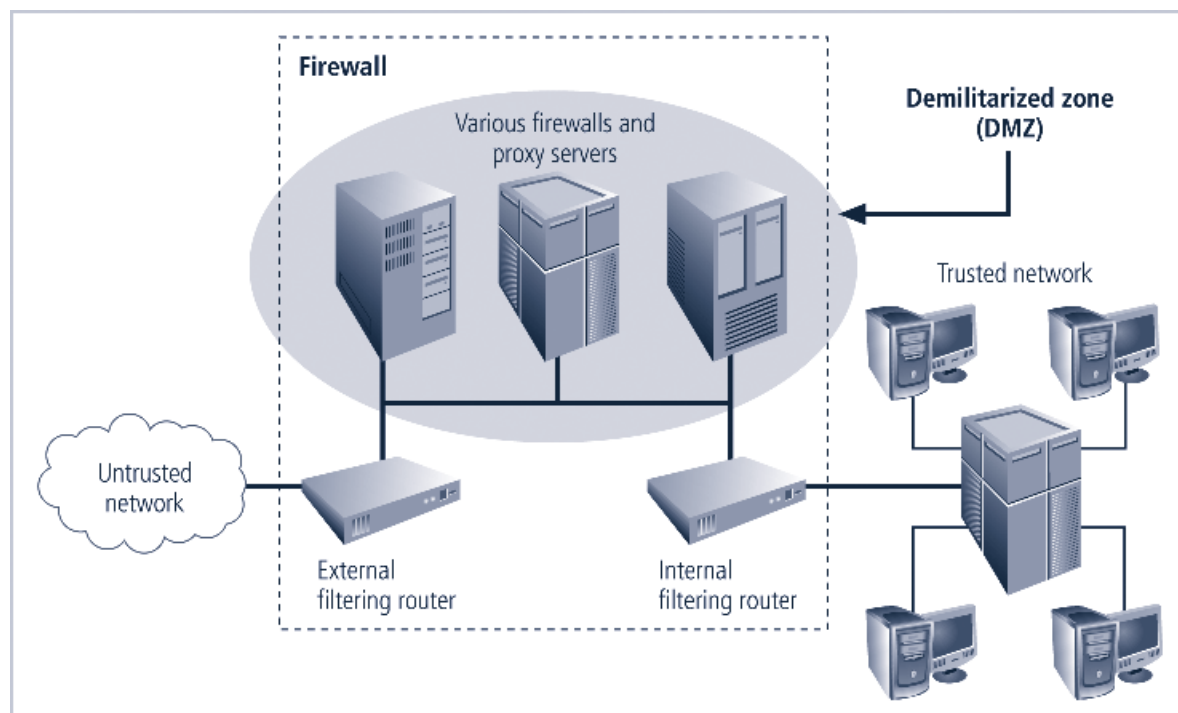


Fig5:Firewall , proxy server and DMZ(Demilitarized Zone)

Source: Principles of Information Security, 4th Edition"

Proxy server: A proxy server sits between an internal trusted network and the untrusted network, that is, internet, Mainly, it can do three things: Figure : 5 Firewall ,proxy server and DMZ(Demilitarized Zone) An http request from the browser goes to proxy server. It can affix its own IP address instead of IP address of the requesting machine; thus, it hides the information of the host. It downloads the requested page itself and afterwards supplies it to the user. It can also act as a firewall filtering requests for certain web pages. An important job it can do is to speed up the processing of http requests by caching web pages. Caching means that it can store the requested web pages in its memory (cache memory) for a certain period. The advantage of caching is that for subsequent web page requests the time of supply of the web pages is reduced. Instead of sending the request to actual web server, the proxy server can quickly supply the web page stored in its cache memory, thus, it saves the time of downloading the page.

Packet filter firewall :It uses a set of rules to determine whether outgoing or incoming data packets are allowed to pass through the firewall. For example, we can, as a rule, specify IP addresses of sending devices such that packets from these IP addresses are not allowed to enter the network. The Firewall would stop them from entering.A packet filter firewall is the simplest type of firewalls which operates at data link and network layers of the OSI model. It uses a set of rules to determine whether outgoing or incoming data packets are allowed to pass through the firewall. For example, we can, as a rule, specify IP addresses of sending devices such that packets from these IP addresses are not allowed to enter the network. The Firewall would stop them from entering.Consider figure :6 Packet Filtering Router.

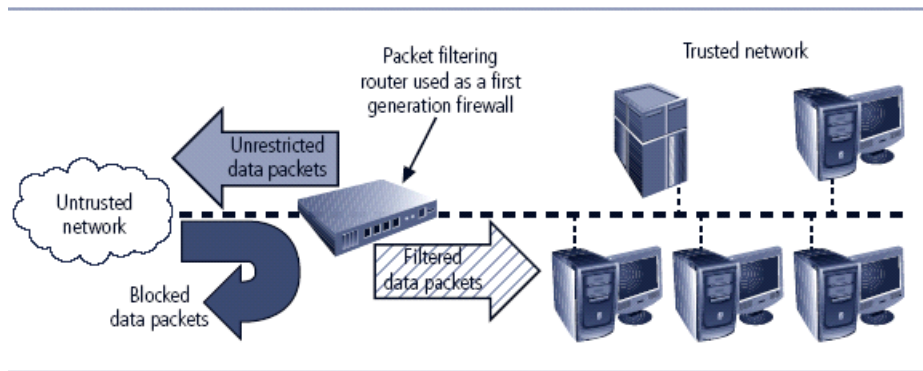
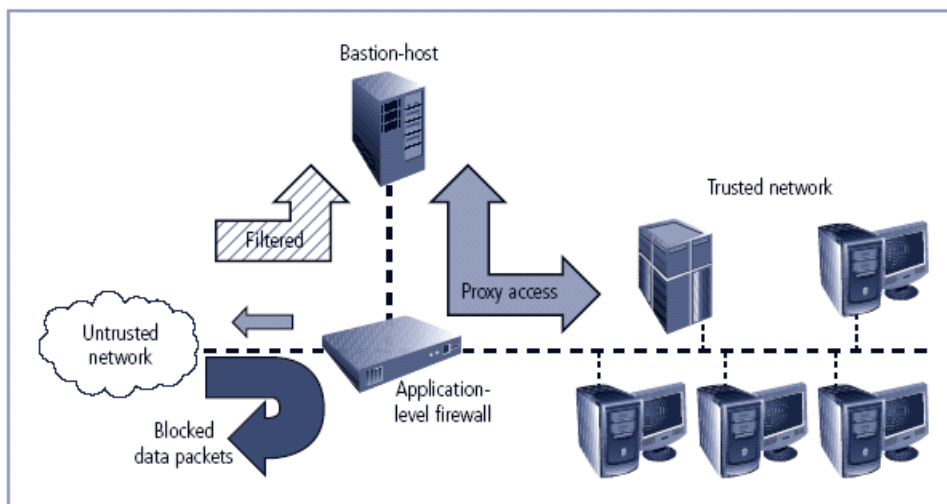


FIGURE 6-4 Packet Filtering Router

Source: Principles of Information Security, 4th Edition

Circuit level firewall: It works on the basis of a set of rules for filtering packets but operates at the transport layer of the OSI Model so has greater functionality. As a rule, the higher the layer of OSI model where a firewall operates, the more sophisticated is the firewall. It can make packets sent from internal network to a destination outside the firewall appear as if they originated at the firewall. Thus information regarding hosts on the internal network remains secret. It can also determine whether TCP/IP (Transfer Control Protocol / Internet Protocol) connection between a host and a machine outside firewall has been properly established. Thus it can cut off any connection which has been hijacked by a hacker trying to pass through the firewall.

Fig:7: Screened host firewall, Cryptography and Network Security



Source: Principles of Information Security

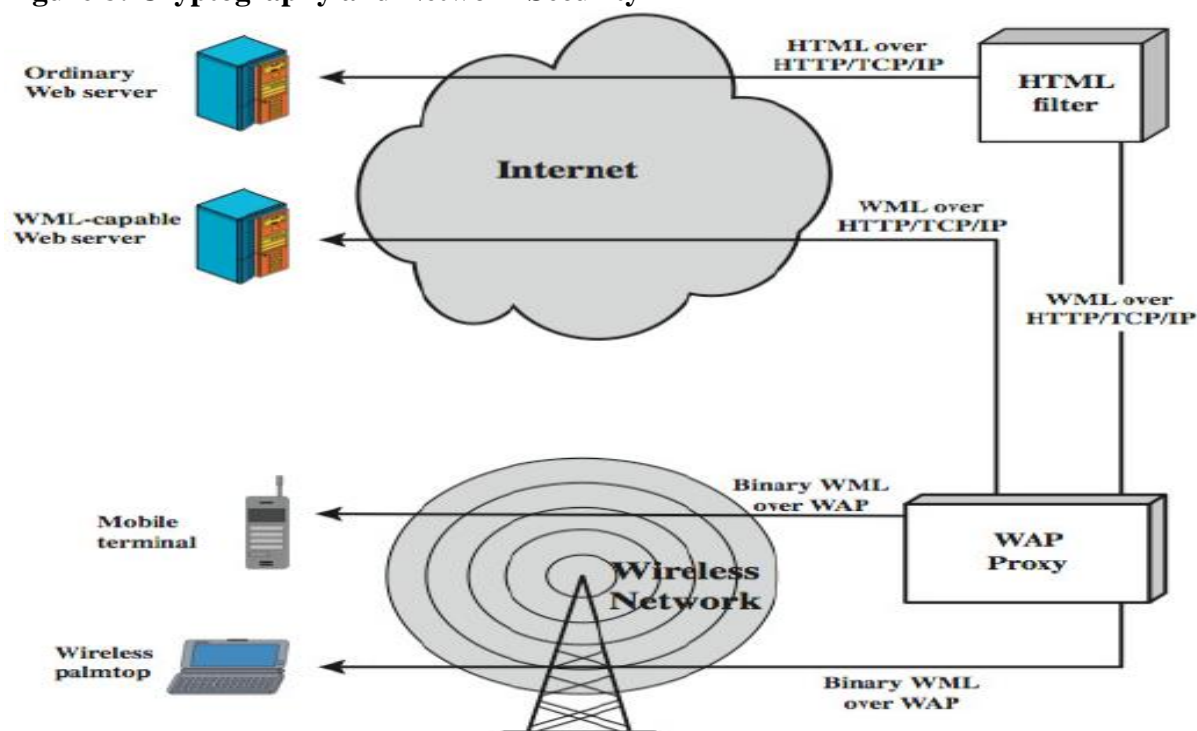
Cryptography: Cryptography is the technique of converting a message into unintelligible or no understandable form such that even if some unauthorized or unwanted person intercepts the message he/she would still not be able to make any sense out of it. Cryptography is thousands of years old. Techniques used for cryptography Substitution In substitution we replace each letter in the message with another to make the message no understandable. For example, each letter "a" in the message can be replaced with letter "d" and letter "b" with letter "e" and so on. Transposition It is based on scrambling the characters in a message. A

transposition system may first write a message into a table row by row then the message can be read and rewritten column by column to make it scrambled. Historically, cryptography has long been used as a military technology. Julius Caesar used a simple transposition cipher to scramble messages to give instructions to his commanders in the battlefield. Similarly, Hitler used Enigma encryption cipher to scramble messages sent by radio to German armies and uboats during the Second World War. Cryptography has also been used for nonmilitary purposes over the centuries.

There are records of people using cryptography to protect religious secrets and to hide secrets of science and industry. In recent years, the use of cryptography in business and commerce appears to have surpassed its earlier use. It has made the rapid commercialization of internet possible. Without cryptography, it is doubtful that banks, businesses and individuals would feel safe doing business online and mobile banking. Consider Figure 7. Cryptography and Network Security.

From research ,Cryptography is a collection of mathematical techniques used to ensure confidentiality of information. The process of scrambling a message with the help of a key is called Encryption. The process of unscrambling a message using an appropriate key is called decryption .Keys are numbers or characters that are randomly generated with the help of some cryptographic algorithm. Pretty Good Privacy (PGP) is the name of a popular cryptographic system which is available for general public use. There are two types of cryptography Symmetric And Asymmetric cryptography. Symmetric Cryptography. In symmetric cryptography same keys are used for encryption and decryption. Asymmetric or Public Key Cryptography. In this type a pair of public and private keys is used for encryption and decryption

Figure 8: Cryptography and Network Security



Source: William Stallings – Cryptography and Network Security, 5th Edition

Web Application Security and Mobile money Transfer MOBILE PHONES AND STANDARDS

Almost all current mobile phones have wireless networking features built-in. Strongly affecting the use of mobile phones and terminals for data services are the significant limitations of the devices (in processors, memory, and battery life) and the networks (relatively low bandwidth, high latency, and unpredictable availability and stability) that connect them. The user interface is also limited; displays are small, and all these features vary widely across terminal devices and networks. The Wireless Application Protocol (WAP) is a well-known standard for data communication through mobile devices.

Mobile phones have advanced with new technologies and services, causing phone and the carrier networks that support them to be described in generations: – 1G: refers to the original analog cellular standard (Advanced Mobile Phone System, AMPS).– 2G: refers to the digital cellular network – 3G: system of mobile networks allowing carriers to offer a wide variety of services to the consumer, including broadband data service and video calling. – 4G: refers to the planned move to an entirely IP-based network for all services, running voice over IP (VoIP) on the mobile phone.

WIRELESS APPLICATION PROTOCOL (WAP) AS AN INFRASTRUCTURE FOR MOBILE MONEY TRANSFER

The Wireless Application Protocol (WAP) is a universal, open standard developed by the WAP Forum to provide mobile users of wireless phones and other wireless devices, access to telephony and information services., WAP is designed to work with all wireless network technologies (e.g., GSM, CDMA, TDMA).The WAP Programming Model is based on three elements: the client, the gateway, and the original server. The gateway acts as a proxy server for the wireless domain. Its processor(s) provide services that offload the limited capabilities of the hand-held, mobile, wireless terminals. For example, the gateway provides DNS services, converts between WAP protocol stack and the WWW stack (HTTP and TCP/IP), encodes information from the Web into a more compact form that minimizes wireless Communication, and, in the other direction, decodes the compacted form into standard Web communication conventions. The gateway also caches frequently requested information.

AIRTEL MONEY IN KENYA

ZAP, the predecessor of Airtel Money was relaunched in 2009 as the second largest MMT in Kenya after MPESA. This was after the failure of *Sokotele*. Zain was eventually acquired by Indian Telecom giant Airtel in 2010 and ZAP underwent a rebranding exercise and was renamed Airtel Money to conform with Airtel's policy of uniformity of OPCOs (Chivan Bharghava-Airtel Kenyan OPCO 2013). Airtel has evolved several times since 1998 when it was licensed as a second MNO under the name Kencell. Kencell made a significant impact on the then infantile mobile market as having a higher market share than Safaricom. The company later changed hands and was rebranded as Celtel which was the second largest MNO in Africa in terms of subscribers after MTN of South Africa. In late 2004, Mohammed Amin, Sudanese born British entrepreneur sold a majority stake to Zain a Kuwaiti Oil Conglomerate. But by 2008, the Kuwaiti investors had put up all their African operations on the market. The African operations were quickly grabbed by Airtel India which was the fastest growing MNO in the Indian subcontinent with over 45 Million subscribers with 37% market share(Africa Weekly 31, August 2012).Airtel Money charges a fixed rate on its

transfer service across all networks. In the recent past, Airtel Money registered subscribers have been transferring cash to P2P and P2B free of charge across competing networks. The maximum e-value is Ksh.140,000 while withdrawal attracts between 160 and 200 from registered Airtel Money subscribers and unregistered.

METHODOLOGY

Scope of the study

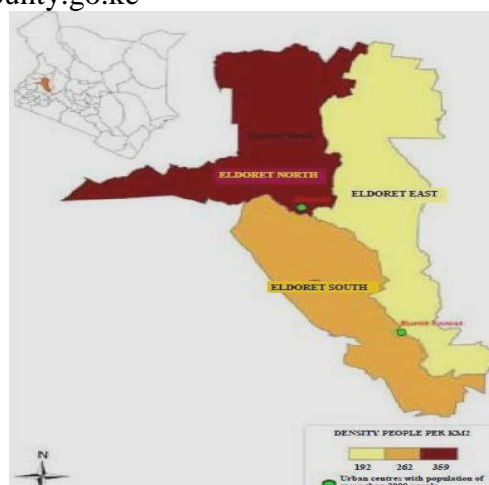
The study will revolve around data derived from Communication Commission of Kenya (CCK) Base Transmitter Station Portals. The data is collected from Base Transmitter Stations of different Mobile Network Operators and transmitted directly to CCK servers in Kabete Nairobi. The Base Transmitter Stations (BTS), every 24 Hours send data to CCK on the activities in the networks which include new activations, details on mobile money transactions and agent transactions and other VAS services. The study will focus on Eldoret Town and Rural territories. These BTS are strategically installed in high population areas and provide such services as Mobile Money Transactions, SMS, voice services and data services. A recent survey conducted by Kenya Bankers Association in collaboration with Think Business Limited revealed that 6 out of 10 Kenyans receive and send money through their phones and only 3% of Kenyans go to banking halls, while only 8% use Automated Teller Machines(ATMs)(James Anyanzwa and Angela Owino,2014). The survey was carried out on 1294 respondents across the country.

Study site

The study site is specifically the North Rift Zone. CCK has demarcated the country and comprises eight zones namely Nairobi, Nyanza (South Rift and Nyanza), Central (Central and part of Northern Kenya), Coast, Eastern, Western, North Rift and South Rift. The zones are demarcated depending variables such as population density, number of channel partners serving a given area, terrain and number of BTSs installed in a particular area.

A rural zone, say South Rift has averagely 300 BTSs and also has a population of not less than 3 Million. However the number of subscribers (population) increases in urban areas which are also densely populated. North Rift has a combination of urban and rural settings. The site comprises all BTSs within the Uasin Gishu County which runs 2995 square kilometres with a total population of 849,179(2009 Census) and also extends to Moiben, Turbo, Kipkarren River and surrounding areas. Below find the map of the site.

Source: www.uasingishucounty.go.ke



Study population

The study population comprises 247 Base Transmitter Stations owned by different Mobile Network Operators in Uasin Gishu County. The area which will be used to collect data for this study (Eldoret town and rural) is only a small fraction of the total area under coverage by MNOs. Therefore data derived for this study may not be a true representation of the entire country's Mobile Money performance. In the collection of availability/visibility data, observation without the assistance of questionnaires may lead to non accurate data.

Sampling procedure:

The proposed method to be used for sampling will be a Non Probability Sampling Method. This is due to the high volume of data that will be derived from the Sample. Because all BTSs marked Uasin Gishu County will be used to derive data. This data will mainly be used to determine month-on-month variances in Mobile Money activations and transactions.

Based on a retail census carried out by CCK every two years, data of the census will be used to measure availability and visibility of Mobile Money Agent outlets in densely populated areas of major towns around Uasin Gishu County namely Eldoret Town, Burnt Forest, Soy, Mois Bridge, Moiben and Cheptiret. This will be compared to the total head count of all MMT outlets regard less of the MNO per street and come up with an average percentage.

Data collection instruments and procedures

The data us usually transmitted to a server and stored in Excel sheet. The data is the collated and analyzed giving daily averages of each MNO.

A head count of MMT service agent outlets will also be done in major towns to compare variances. A glance at daily transactions in the transaction books in different agent outlets will be used to verify data derived from CCK.

Data Management and Analysis

The guideline below will be used to collect and analyze data.

Data Analysis matrix

	Objective	Nature	Analysis technique
1.	Visibility/availability	Categorical	Frequencies
2.	Month-on-month variances in MMT transactions	Categorical	Frequencies T-Test
3.	Month-on-month activation variances	Categorical	Frequencies Chi Square

Dissemination of findings

The results will not only be used for the MBA thesis but may also be utilized by MNOs in improving their acquisition strategies. Findings will also be availed to CCK and the respective MNOs to facilitate evidence based strategy that will benefit the end users MMT users on the various MMT Platforms and the many unbanked Kenyans.

Ethical Issues

The CCK Regulatory Affairs and Legal Services Director (Kenya OPCO) will be consulted for consent to collect data beforehand. The purpose of the study will be explained to the Management in order to seek consent to use data. Requirements in regard to the data needed for the study will be communicated to CCK data analysts before retrieval of data

Confidentiality will be ensured by not sharing sensitive data to parties outside CCK. Further a password will be used to protect electronic information in the computer. All the data collected will be stored in private electronic storage facilities provided by the researcher.

RECOMMENDATIONS

From the study data it is evident that the CCK has little control on the activities of each MNO and it will be appropriate if CCK monitors activities by recruiting data analysis who will be reporting on MNO activities. The CCK should also review its Network Sharing guidelines to reduce use of many BTSs and reduce costs of running networks. A unified platform for sharing Agents under a profit sharing agreement should be established. Other recommendations should be based on examination of data derived from CCK.

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