Recent Technological history Education for Leapfrogging in defining tomorrow's Workplace with Disruptive Technology

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Abstract

Predicting the future accurately depends on keeping pace and mastery with the dynamic unfolding ICT revolution. Technology as a body of knowledge used to make life easier develops tools to solve the present and future problems. Technology has shaped the today's work place and is already sketching tomorrow's workplace by its ability to improve our abilities. History-to-future thinking has three major predictive models. The third predictive mode is certainly the most systematically developed and entails looking at recent history for the trends that are likely to continue in the future. This mode is conservative in use but is often the most accurate. Research pegged on prior learning theory which postulates that the ability to learn and remember new material depends on what is already known. Research adopted the descriptive survey, data being collected from case studies. Ex post facto - after the facts research done retrospectively in search of tangible relationship or effects to future predictions. Key findings: Recent targeted technological history reveals trends that are likely to continue in the Future. Backward or past events study attempts to offer an explanation for the future which man has a craving to know and predict the future, explaining why masses continue to flock to fortune-tellers and astrological charts for predictions based on historical events. Recommendations; Leapfrogging by developing nations is only premised on frequently reviewing and updating their education curriculums to enrich them with purposeful targeted history of technological for defining and securing tomorrow's workplace.

Keywords: Disruptive technology, workplace.

Introduction

Predicting the future accurately depends on keeping pace and mastery with the dynamic unfolding ICT revolution. Technology as a body of knowledge used to make life easier develops tools to solve the present and future problems. Technology has shaped the today's work place and is already sketching tomorrow's workplace by its ability to improve our abilities. in this era of rapid technological succession of change 'business at the speed of thought' will exclusively be 'managing with the force of facts' the only way to put distance between your company and the crowd is to do an excellent job with information (Gates, 2001). There are more competitors today and equally more information available about them and about the market, which is now worldwide. The winners will be the ones who develop a world-class digital nervous system so that information can easily flow through their companies for maximum and constant learning. This was the gap-problem in the market that was met by mobile phone money transfer technology in Kenya. In this age of innovations that create a new market and value network and eventually disrupts an existing market and value network, displacing established market leading firms, products, and alliances Gates argues (2001) no company can assume that its position in the market is safe. A company should constantly be thinking about its options. One company might be hugely successful if it broke into another business. Another company might find that it should stay with what it knows and does best. The most important thing is that a company's managers have the information to understand where they can compete and what their next great market could be. The Japanese philosophy of *kaizen*: "continuous improvement of everything, by everyone" is a live saver here. Staffs at all levels are tasked with improving processes and products through "quality circles." M-banking Technology is eradication the digital divide but also reversing the problem of "haves" and " have-nots" by enabling leapfrogging in defining tomorrow's Workplace. The tools of the Industrial Age extended the capacities of our

muscles. The tools of the digital age extend the capacities of our minds M PESA as a disruptive technology in the banking and money sending industry is the fulfillment Bill Gates' dream of business at the speed of thought. Digital tools extend the abilities that make us unique in the world: the ability to think, the ability to express our thoughts, the ability to work together to act on those thoughts. (Gates, 2001)

M PESA as recent disruptive technology has educative transformational and leapfrogging lessons that are defining tomorrow's Workplace from down the developing world up to the developed world. Kenyans are teaching the world to expect the unexpected since March 2007 when Kenya's largest mobile network operator, launched as an innovative payment service for the unbanked (Hughes, 2007).

Statement of the problem

History-to-future thinking has three major predictive models. Firstly, predictive mode assumes that certain types of past developments (historical events) will happen again, and that by mastering history, future recurrences can be better handled. This thinking underpins the old adage, "The ignorant of history are condemned to repeat it, since what goes around comes around" The second predictive mode involves assumptions about historical disruption phenomenon; where predictions highlight the belief that some force is about to radically change the course of history, and therefore, the future. The third predictive mode is certainly the most systematically developed and entails looking at recent history for the trends that are likely to continue in the future.

This third model is the instrument in this research for analyzing introduction of mobile phones in the developed nations in the 1950s (Dunnewijk & Hulten, 2006), which spread like a wildfire to become world's fastest spreading technology in the history of humankind (Castells et al., 2007; Camner & Sjöblom, 2009a; Jack & Suri, 2009). Once considered luxury items, mobile phones have now become an integral part of everyday life for many people. Mobile phones have become "the single most transformative technology for development in the world" argues the Nobel Prize winner and development economist Jeffrey Sachs, (Must & Ludewig, 2010: 27). Mobile phones facilitate social and economic development through increased access to information, people and services like health, education and market information (Must & Ludewig, 2010).

The rapid adoption of mobile telephony in the developing world can be attributed to low penetration of fixed line phones in the Africa and in the whole of the developing world. Research shows only 3 people per 100 inhabitants have access to fixed lines in Africa which has made mobile phone the only viable alternative available for communication hence, their quick adoption in the developing world. The privatization of the telecommunications industry from government opened the door for competition and allowed multi-national companies to operate in different countries (Hamilton, 2003). This came with increased innovation in the industry which increased the speed of connection and lowered prices led to increased accessibility and affordability of the mobile communication. Broadband access and satellite communication which reduced the rate of connection have contributed to its widespread use (Ling, 2004). Socially mobile phones cemented relationships as they enabled people to stay with each other almost anywhere, anytime (Kumar, 2004). Mobile phones provide the ability to move with the person and provide service while on the move. As long as users are within the range of the network coverage, mobile phones are time and space independent (Suoranta, 2003). Decreased price of mobile handsets and the decrease in their size has contributed to the expansion of their use. Mobile handset manufacturers quickly realized there is a need for affordable, basic mobile handset in the developing world. The cost of a basic mobile handset now costs around KES 1600 (Ling, 2004; Must & Ludewig, 2010). As part of our day to day life, mobile phones have the potential to be used beyond their primary use of making voice calls. Pay as you go/prepaid schemas with no need for subscription and monthly payments have made managing money easier (Minges, 1999; Ling, 2004) and the possibility of business at the speed of thought is a reality in Africa courtesy of M PESA. The guiding principle during the launch of M PESA in Kenya was that 'getting cash into the hands of people who can use it is limited on the supply side rather than demand-side; there is no shortage of funds, but it's the ability to move money from the sender to the receiver that is the stumbling block (Nick H. and Susie L. (2007). Since the creation of money, the ability to move it from A to B—the so-called "velocity of money"—has been a fundamental cornerstone of economic activity. But the issue is exactly how money transfer is made to happen in an emerging market where the infrastructure is poorly developed and where very few people have or even want bank accounts. Bill Gates (2008) in 'the road ahead' has demonstrated that to understand the future, it helps to look at the past. Mobile

phones are being used to deliver value added services beyond voice call and SMS. One of these innovative services that can be delivered through mobile phones is mobile banking (M-banking).

Definition of mobile banking

M-banking can be termed as m-money, m-payment, m-transfers, and m-finance. In this research, only the term m-banking is used and Donner (2008) has defined m-banking as "a set of applications that enable people to use their mobile telephones to manipulate their bank accounts, store value in an account linked to their handsets, transfer funds, or even access credit or insurance products." Some m-banking applications such as provided only three services when it was launched, i.e. depositing and withdrawal of money into and from an account, money transfer and purchasing of airtime (Hughes & Lonie, 2009). M PESA has however evolved through time to encompass other services, including loans and insurance services (Safaricom, 2009).

Research focus

1) Investigate whether there was a gap in the Kenyan Market that answered
2) To analyze whether there was in addition to a gap in the market, there was a market in the gap that M PESA capitalized for enough business to generate sustainable profit? i.e.
3) To determine if Innovation/ continuous improvement is what has managed to keep on top i.e. if innovation/ continuous improvement is its competitive advantage—the factor that gives it an edge over its competitors.
4) To establish if Safaricom and M PESA is keen on who is competing with its customers' time and money? What are their strengths and weaknesses? How are they perceived in the market? I.e. countered by continuous customer education on new products and services as well as Scam Education. Communication that is well understood and easy to communicate
5) To determine if Safaricom M PESA is gliding on the advantage of First-movers, no competition and have become market leaders...
6) To establish if the market is static, and technological innovation is limited, what are the risk of failure
7) To investigate if later entrants entering a recognized market and knowing what mistakes to avoid stand to benefit most in a rapidly changing market, in which technological innovation is advanced
8) To establish if in order to gain an edge, a business must either be first, or be better.

Significance of the research

a) This research contributes to the body of knowledge in the following ways. Since no company can assume that its position in the market is safe constantly be thinking about its options (Gates, 2001). This is the Japanese philosophy of *kaizen*: "continuous improvement of everything, by everyone." The most important thing is that a company's managers have the information to understand where they can compete and what their next great market could be.
b) But very little research has been done concerning the transformational effects of m-banking on the economic, social and cultural context in which it evolves. Thus, the need for more empirical research is recognized.
c) This research highlights how M-banking technology is eradication the digital divide but also reversing the problem of "haves" and " have-nots" by enabling leapfrogging in defining tomorrow's Workplace.
d) The tools of the Industrial Age extended the capacities of our muscles. The tools of the digital age extend the capacities of our minds M PESA as a disruptive technology in the banking and money sending industry is the fulfillment Bill Gates' dream of business at the speed of thought. Digital tools extend the abilities that make us unique in the world: the ability to think, the ability to express our thoughts, the ability to work together to act on those thoughts. (Gates, 2001)
e) This research, therefore, contributes to the growing debate and commentary on various aspects of m-banking and its business operational environment where it is empowering for leapfrogging from the developing world up to the developed world. This research makes a contribution by presenting an interpretive case study on M PESA as a disruptive technology that is defining tomorrow's Workplace. This research therefore demonstrates how interpretivism and case study research can be applied to study an m-banking application.

f) Finally, the research contributes to the discipline of educational technology and entrepreneurship by undertaking scholarly research within the scope of the field.

Research Strategy

Case study research strategy seems appropriate for this research. The reason for this choice is twofold. Firstly, case study is suitable to gain in-depth understanding of a contemporary phenomenon in its natural environment (Benbasat, et al., 1987) which correlates with the research objective of this study. Secondly, case study is suitable for supporting the philosophical theory of prior learning selected. As noted in not much research has been done in this field since the phenomenon (M PESA) is new (barely four years) and the relationship between the application and society remains largely unexplored. This justifies case study as an appropriate strategy for this research.

The choice of case study as a research strategy has two advantages. Firstly, case study is used to gain in-depth understanding of a contemporary phenomenon in its natural environment (Benbasat, et al., 1987) which correlates with the research objective of this study. Secondly, case study is suitable for the paradigm selected. Most interpretive researches adopt research strategies which engage the researcher in the real social setting like field studies, ethnographic studies and case studies (Chen & Hirschheim, 2004; Weber, 2004). Case study research strategy like any other research adopting interpretive approach engages the participants and collects data from multiple sources (Yin, 1994).

Literature Review

This review show gaps in the existing pool of knowledge and justifies the need to undertake the research (Roode, 2008) and justifies the contribution made by this research.

The basic themes for the literature review are to:

1. Understand mobile banking and how as disruptive technology that is defining tomorrow's Workplace.

2. Determine studies done in mobile banking in various disciplines and discover any existing gaps.

3. Review research done on the introduction of mobile banking to society and the reaction thereof.

4. Outline and review the different theoretical frameworks used to study the relationship of mobile banking and people.

5. Investigate the kind of research approaches used in the mobile banking in different fields.

The first step taken to collect relevant literature was to gain insight into mobile banking as a disruptive technology by reading different non-academic sources like newspapers, blogs, and Wikipedia (www.wikipedia.com). Different methods were used to collect relevant academic literature. Academic databases which publish information systems research were searched using key terms related to mobile banking. Porteous (2006) categorizes m-banking into additive and transformational m-banking premised on the type of customer an m-banking application targets. Additive m-banking is an extension of the traditional branch-based banks (Luarn & Lin, 2009). Using additive banking, people can manipulate their existing accounts using their mobile phones. The main reason for the introduction of this kind of m-banking is to give customers the convenience of mobile phones (Donner, 2007). It targets people who already have bank accounts (Porteous, 2006). Additive m-banking applications were the first to be introduced and are very common in the developed world (Donner, 2007).

The transformational mobile banking is the disruptive technology as it aims to provide financial service for unbanked and under banked segment of the population (Porteous, 2006). Having an actual bank account is often not required to subscribe to this type of mobile banking (Mehdi et al., 2009). It is believed transformational m-banking can attract poorer segments of the population and people from rural areas (Bangens & Söderberg, 2008). Transformational m-banking is more appealing to people in developing countries as the need for mobile banking in these countries emanates from the lack of access to formal banking infrastructure rather than supplementing it. Transformational M-banking, in this case, disrupts the formal banking system rather than convenience (Cracknell, 2004; Donner, 2007). Disruption refers to rewriting the rules changing the game.

A. Brief history, terms definitions and operational dynamic of services

In March 2007, was launched nationwide as a money transfer method.

This appealed to many Kenyans as there are many immigrant workers in cities and towns

who need money transfer services to send money to their family upcountry.

"Pesa" is the Swahili word for cash; the "M" is for mobile.

Every m-banking prospective is expected and to do three things (Donner & Tellez, 2008: 320):

i. Open an m-banking account which can be manipulated from a mobile phone.
ii. Convert cash in and out of the account.
iii. Transfer money from one account into another. This can be person-to-person transfer, long distance remittance, person-to-business transfers or payments, and purchase of airtime.

In addition to these services, m-banking applications have administrative tools which allow users to manage their accounts like checking their balance, changing security measures, etc (Donner & Tellez, 2008). Some m-banking applications open doors to more financial services like savings, loans and insurance.

B. operational and service terms

Registration for services can be done with the 35,000 authorized agents located all over the country (Mas & Radcliffe, 2010). Registration is free of charge. Users are required to produce an ID or a valid passport for purpose of identification for registration

1. Mobile phone subscribers of all network operators can withdraw money sent through . To register for , users must first be Safaricom subscribers. Users are required to produce a national ID or other forms of identification (passport or driving license) for registration. The details of the user are entered into the agent's phone immediately. After registration, users are provided with an electronic money account which is accessible through their mobile phone (Mas & Morawczynski, 2009; Mas & Radcliffe, 2010).

2. Depositing money: When users want to deposit money, they go to one of the agents and request to make deposits. The users, with the help of the agents, fill out a form. The forms have details of the transaction such as the transaction number, amount of deposit, depositor's name and ID number, date and signature. The form is mainly used by the agents to track their transactions. The agent then receives the cash and deposits the equivalent amount of e-money (e-float) into the account of the users. Depositing money is free of charge. Both the user and the agent receive SMS notification of the transaction.

3. Sending money (person-to-person): This is the most popular service offered by . It is used to transfer money from one person to another. There is a service charge for sending money.

4. Withdrawing cash: This service is used when users want to convert the e-float (balance) in their account into cash. When users choose to use this option, they will first be asked to enter the agent number. The agent number is a unique number used to identify agents. Agents clearly display their agent numbers in their shops. The second thing the users have to input is the amount of money they wish to withdraw. There is a graduated charge for withdrawal service.

5. Buying airtime: user can buy Safaricom airtime credit for their phone or other people's phones from their balance in the account.

C. Transformative and disruptive aftermaths of

Paying bills (customer-to-business)

This service was introduced at the end of 2007. It allows customers to make payments to companies. To use this service, the organizations first need to enter into partnership with and receive accounts. The organizations are then given unique business numbers which their customers use to identify them. In addition to the business number, customers also enter their account numbers (issued by the business organization) which are used to uniquely identify them. The money collected through the pay bill application is paid into an business account which is only released into the organization's bank account and no other. The main users of this service are

utility companies, schools and financial institutes including banks, micro-finance institutions and insurance companies. The service charge for this service is shared between the business and its customer.

Buying goods (customer-to-business)

This service is similar to the pay bill application but it is specifically used for supermarkets and other retailers to accept money through at their till points. It is designed as a payment method for Point of Sale. The users are required to enter the till number, the amount to pay and their PIN number. The customer gets SMS notification of the transaction. As in pay bill applications, businesses also have to register to be able to use this service. The buy goods service was launched in October 2010 and currently has three corporate customers. The service charge for this service is shared between the corporate and its customer.

ATM withdrawal

This service was launched in September 2008 in partnership with Pesa-Point, an independent ATM network that provides ATM services for over 30 banks operating in Kenya. In addition to Pesa-Point, this service was later extended to include the ATMs run by Equity Bank and Diamond Trust Bank. users can now withdraw cash from 650 ATMs located around the country without the need for a debit/credit card. The system works in a slightly different way from withdrawal from agents. The users choose ATM withdrawal from the menu, and then enter the agent's (ATM's) codes and their PINs. Then the users receive 6-digit authorization numbers via SMS. They then choose from the ATM's menu, enter the authorization number, their phone numbers and the amount of cash they want to withdraw. The ATM then releases the money and a receipt. An SMS notification of the transaction will also be received. There is a service charge for this service.

M-KESHO

Signed an agreement with Equity Bank to provide banking services for users in May 2010. M-KESHO, the main service introduced by this agreement is a bank account which provides a service similar to savings which earn interest as well as micro-credit and insurance facilities. M-KESHO users must first be users before applying for M-KESHO by accredited agents and all Equity Bank branches. M-KESHO customers can transfer money from their Equity Bank accounts to their accounts. They can also deposit money into their Equity Bank account using their accounts on their mobile phones.

Bulk payments (business-to-consumers)

In March 2008, it was introduced a service which enables businesses to make bulk payments. This service has enabled organizations to send money to many people throughout the country and to pay salaries to their employees working in the field. Previously, these employees had to travel long distances to bank branches to get their salaries. Other uses of this application include promotional payments, dividend payments, and social payments.

International Money Transfer

Started providing international money transfer services in December 2008. The services are provided by Safaricom in partnership with Vodafone (U.K.) and Western Union. Using this cross border money transfer service, people in the U.K. can go to a Western Union branch and send money to account holders in Kenya via their mobile phones. The money is received instantly and any delay is similar to delays in SMS messaging. Both the receiver and sender get SMS notification of the transaction. The money received can be used like any other money in an account.

My account

This is an administration application where users can change their PIN numbers or secret words, language, requests for balance, call the customer center, and download new menus. When introduces new applications, users are required to download the new menu which is sent to them using SMS.

D. Disruptive nature of is enforced by task and environment

Use of Technology depends on the task, the environment and other sources of social structure

In the interaction between technology and people, technology is only one source of structure (DeSanctis & Poole, 1994). Other sources of structure are tasks, the environment and new sources of structure that emerge during the interaction. The following section outlines the tasks is used for and the environment that M PESA operates in.

Task

Tasks are the different activities that can be accomplished with or without technology. When technologies are employed to accomplish these tasks, they are considered to have accomplished them in a better way (DeSancits and Poole (1994). The main tasks for which is used are: depositing and withdrawing of money; person-to-person money transfer; customer-to-business money transfer; business-to consumer transfer. Cash, checks and bank transfers have been used for business-to consumer transfer. has provided capabilities to accomplish these tasks by converting cash into electronic money and transferring the money from one account into another using SMS based technologies.

The environment of

The environment operates in can be described by different factors. Some of the factors that influence the use of are access to financial services, access to mobile phones, and regulatory framework.

a) Access to financial services

According to a survey done by FinAccess (2010) in 2009, from this adult population, 22.6% is formally included in the financial service sector 32.7% is completely excluded from the financial sector.

b) Access to mobile phone

When the mobile market was liberalized in 2000, Safaricom became the first privately owned operator providing mobile services. Besides Safaricom, there are three other mobile operators: AirTel, Orange and Yu. In the last ten years, the number of mobile subscribers has increased to 18 million (Jack & Suri, 2009). This translates to almost 83% of the population above the age of 15 (Jack & Suri, 2009). FinAccess (2010) estimates that almost half of adult Kenyans (47.5) had access to mobile phone by the end of 2009. Safaricom has 80% of the market share while the rest share the remaining 20% (Jack & Suri, 2009).

New sources of structure emerge as the technology, task and environment are applied in specific social interaction. The main sources of structure when a technology interacts with people are the technologies themselves, the task at hand and the environment they operate in. When these three sources of structure interact with each other, other sources of structure emerge (DeSanctis & Poole, 1994).New social structures emerge as the technology is appropriated in a given context over time (DeSanctis & Poole, 1994).

Research Questions

The literature search, confirmed that is embedded in a complex social and economic context and that it has gone through various changes over the years. During this interaction, has affected and will continue to affect the environment in which it operates by changing the way things are done while simultaneously being impacted by environmental factors and its appropriation. Based on the statement of the problem, and research focus and the literature review, this study pursues the following research question:

How M PESA rewritten the rules of the banking industry of the 45 million Kenyans?

To answer this general question, the study responds to the following sub-questions:

i. How has evolved through its short history from being primarily used in person-to-person money transfers to its wide spread use in different sectors of the economy? This question attempts to find out the factors that have contributed to the evolution of over the years.
ii. How has influenced/ changed/ affected the way business is conducted in Kenya? This question attempts to investigate the new capabilities, ideas and values that have evolved from the introduction of in Kenya thus focusing on the way businesses are done.

iii. How has the usage and adoption of influenced's evolution and design? The purpose of this question is to determine how environmental (social, regulatory, economic and cultural) factors and usage patterns of affected its subsequent design and evolution.
iv. Was there was a gap in the Kenyan Market that answered?
v. Is the market static and technological innovation is limited? What must a business do in order to gain an edge, must it be either first, or be better?
vi. Is there was a market in the gap that M PESA capitalized for enough business to generate sustainable profit

Theoretical Framework

Research pegged on prior learning theory which postulates that the ability to learn and remember new material depends on what is already known. Research adopted the descriptive and interpretive approach, data being collected from case studies. Ex post facto - after the facts research done retrospectively in search of tangible relationship or effects to future predictions are the three frameworks which have been used to study the relationship between technology and society in various fields including informatics, organizational theory and sociology. This chapter investigates each theory by discussing their fundamental concepts, strengths and criticism. Upon close examination, and taking into account the objective of this research and research question, prior learning theory is considered an appropriate framework for this study.

Data Collection Method

Research adopted the descriptive survey**,** data being collected from case studies. Both the interpretive research approach and the case study approach lend themselves to qualitative data collection methods (Baskerville, 1999; Chen & Hirschheim, 2004). Qualitative data collection methods engage the participants and allow them to express themselves. In this research, semi-structured formal interviews were used to collect the data. Interviews which lasted from half an hour to one hour took place with the participants. The interview questions were designed based on the research focus.

The interview questions were emailed to some of the participants before the actual interview at their request. During the interviews, some of the questions elicited spontaneous discussions on topics which were not first included in the interview.

Key Results of the Research

An analysis of the data revealed M PESA is recent disruptive innovation which has rewritten rules in various sectors of the economy. It is shown that as a technology has brought features which enabled the Kenyan society including businesses to do more with the technology and to go beyond person-to-person money transfer, the original intention of the developers. It was shown that introduced new ways of making payments and undertaking other transactions. It has also been used as an infrastructure to build new services. The study demonstrated that the subsequent design of the technology has been heavily influenced by its adoption. Users of have influenced its design through direct involvement and indirectly through their appropriation.

has influenced/ changed/ affected the manner business is conducted by

a) Provision of third party services where has helped organizations fight fraudulent activity. These fraudulent activities were sometimes committed by employees while others were committed by outsiders.
b) Decrease in personal interaction as people pay their contribution/ fees/ premium using, face to face interaction between customers and service providers has reduced. Some e-commerce companies and schools use the applications developed to collect payments online.
c) Has also engendered other effects on the social interaction of individuals, new ways of money theft and increased accountability.
d) These are the new services provided by third parties by using as an underlying infrastructure. The existence of is the main reason these services exist. These are online payment systems and ATM withdrawal.
e) New service provision

f) Some companies are now able to provide services they could not provide before the introduction of . For instance, other e-commerce firms are now providing their services to a wider market than they did before.
g) Change in internal operations
h) Companies which participated in the research made changes within their organizations to accommodate. The changes included introducing bill notification using SMS; adjustment of their call centers to handle enquires; and purchasing software to integrate into the already existing systems.
i) Fighting fraudulent activities.

Leapfrogging is only premised on frequently reviewing and updating their education curriculums to enrich them with purposeful targeted history of technological for defining and securing tomorrow's workplace

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