

Financial Innovations and Levels of Risks in Commercial Banks in Kenya

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ABSTRACT

The commercial banks need to identify the sources of the several financial risks which emanates from financial innovations, as they may affect the banks' stability. This study sought to determine the influence of financial innovations on level of risks in commercial banks in Kenya. The specific objectives were to determine the relationship between internet banking and financial risks in commercial banks in Kenya; to explore the relationship between mobile banking and financial risks in commercial banks in Kenya; to establish the relationship between agency banking and financial risks in commercial banks in Kenya; and to determine the relationship between electronic cards and financial risks in commercial banks in Kenya. The study adopted a descriptive research design. The target population was all the 42 commercial banks registered with CBK as at December 31st 2016. The unit of observation will be the risk management managers. This was a census study. The study collected both primary data and secondary data. Primary data was collected from the respondents through a questionnaire while secondary data was collected from the financial statements. Prior to the actual data collection, the questionnaire was tested for reliability and validity. The collected data was analyzed through descriptive statistics and inferential statistics through aid of SPSS software Version 21. The inferential statistics entailed use of a multivariate regression analysis to establish the relationship between the variables and test hypothesis. The analyzed data was presented using of tables, charts and graphs.

Keywords: *Internet Banking, Mobile Banking, Agency Banking, Electronic Cards, Financial Innovations, Financial Risks, Commercial Banks in Kenya*

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1. INTRODUCTION

Innovation has been a core topic for scholars, because of its important contribution to economic growth and to the stability of financial systems (Lerner & Tufano, 2011). Innovation is a double edged-sword; the right kind of innovation and favourable conditions that may spur banks to invest in new technologies would help the financial system fulfill its functions and, as a consequence, deliver growth; but too much of innovation or innovation which is not properly used can have serious consequences on the overall economy (Beck, Chen, Lin & Song, 2012). Banks are intensive users of both financial and information technologies, and the rapid rate of financial innovation over the past few decades is widely recognized as a stylized fact (Frame & White, 2009). The Global Financial Crisis of 2007 to 2009 spurred renewed wide-spread debates

on the “bright” and “dark” sides of financial innovation (Laeven, Ross & Stelios, 2011). The traditional innovation-growth view posits that financial innovations help reduce agency costs, facilitate risk sharing, complete the market, and ultimately improve allocative efficiency and economic growth, thus focusing on the bright side of financial innovation. The innovation-fragility view, on the other hand, focuses on the “dark” side and has identified financial innovations as the root cause of the Global Financial Crisis (Brunnermeier, 2009), by engineering securities perceived to be safe but exposed to neglected risks (Gennaioli, Shleifer & Vishny, 2012; Henderson & Pearson, 2011). While innovations are employed by financial institutions to improve risk measurement and risk control, they however, also encourage risk-taking by financial institutions (Norden, Buston & Wagner, 2014).

Financial innovation is defined as product and organizational innovation, which allows cost or risk reduction for the single bank and/or an improvement of the services for the financial system as a whole (Frame & White, 2012). Banking through technology or electronic banking has emerged as a strategic resource for achieving higher efficiency, control of operations and reduction of cost by replacing paper based and labour intensive methods with automated processes thus leading to higher productivity and profitability (Malhotra & Singh, 2009). Electronic banking not only provides customers with appropriate and faster transactions but also benefits from higher interest rate resulting from cost saving by the banks. On another hand, adopting of e-banking brings additional risks. E-banking operations increased and modified some of the traditional risks associated with banking operations, thereby influencing the overall risk of banking (Sumra & Manzoor, 2011). The growth of mobile phone and the internet has seen integration of these platforms with banking products and services. With the growth of telecommunication industry; there has been innovation in mobile phone financial services platform. Use of mobile phones for person to person, person to business, business to person and ATM payment transfers have increasingly taken off and many banks are offering such services. Agent banking is another innovation in the banking sector (CBK, 2015). Some of the notable financial innovations include in the Kenyan banking sector includes: mobile phone platforms, internet banking, RTGS (a Kenya Electronic Payment) and agency banking. For instance, the growth of mobile phone platforms has seen integration with banking platforms. For example in 2010, Equity Bank Ltd partnered with Safaricom to launch M-Kesho account that went beyond transfers to micro-savings, micro-credit and micro-insurance, among others (Njuguna, 2011). Agency banking has also grown with time, as at end of year 2014, there were 16 commercial banks that had contracted 26,750 active agents up from 13 banks in 2013, out of a possible 44 banks in Kenya (CBK, 2014).

Financial risk refers to losses arising from financial variables and operating risks concerning losses arising from variables that have impact on the operations of a business (Banks, 2005). Financial risks comprises of credit risk, liquidity risk, market risk (interest rate risk and currency risk). Financial risks are managed through a process of ongoing identification, measurement and monitoring all type of financial risks the bank is exposed at. Consistency in risk management is ensured through an integrated and methodologically coherent approach to all risks, along with regular monitoring that enables risk management to proactively manage their own portfolios and take corrective actions when necessary (Badea *et al.*, 2010). Frame and White (2012) pointed that innovation is clearly an important phenomenon of any sector of a modern economy, including the banking sector. Successful financial innovation must reduce costs and risks or provide improved services to users. This notwithstanding, certain aspects of financial innovation may pose significant risks which should not be taken lightly. Risk rises exponentially with the

pace of change, but bankers are slow to adjust their perception of risk. In practical terms, this implies that the market's ability to innovate is in most circumstances greater than its ability to understand and properly accommodate the accompanying risk (Greuning & Bratanovic, 2009). Risk management provides the necessary elements to answer the complexity of risk monitoring. The concept of risk management consists both of preventing and minimising the occurrence of certain events and also in their system of identification, evaluation and quantification. Moreover, the risk management goes through development stages, being of great usefulness nowadays in the implementation of measures for diminishing losses that might occur. Risk management in banking involves the process of evaluating the risks faced by a bank and minimizing the costs accordingly (Balteş & Ciuhureanu, 2010).

Kenya's Banking Sector is regulated by the Central Bank of Kenya (CBK) which oversees industry players such as the Commercial Banks, Forex Bureaus as well as institutions of Non-Bank Financial nature. As at December 2016, Kenya had a total of 42 commercial banks and 1 mortgage finance company with two banks; Chase bank and Imperial bank in receivership (CBK, 2016). The Kenyan banking industry is considered the most mature, fastest-growing and largest in East Africa, thereby making it the regional financial leader. A key driver of growth among Kenyan banks remains their ability to tailor products that meet Kenyans' needs, which has helped the country attain one of the highest financial inclusion rates in the developing world (The Report, 2017). Over the last few years, the banking sector in Kenya has continued to growth in assets, deposits, profitability and products offering, leveraging on diversification to alternative channels, supported by favourable macroeconomic environment. As a result, players in this sector have experienced increased competition over the last few years resulting from increased innovations among the players and new entrants into the market (CBK, 2015). The banking sector has evolved over the years with new technologies being introduced in the industry. The banks have been in the frontline of automating their functions to give their customers good service. Kenyan banks have engaged in product innovation where internet banking and mobile banking have taken root in various local banks (CBK, 2011).

The growth of mobile phone and the internet has seen integration of mobile banking applications in the delivery of banking products and services. With the growth of telecommunication industry; there has been innovation in mobile phone financial services platform (CBK, 2015). Some of the notable financial innovations include in the Kenyan banking sector includes: mobile phone platforms, internet banking, RTGS (a Kenya Electronic Payment) and agency banking. For instance, the growth of mobile phone platforms has seen increased number of mobile banking applications (Njuguna, 2011). Internet subscriptions increased from 7.7 million in June 2012 to 8.5 million, with a total number of Internet users estimated at 13.5 million, almost double that of the past year. Mobile Internet users continued to dominate the Internet market with more than 98% of total Internet data subscriptions (CAK, 2013). These also seem to have improved financial performance of the banks and efficiency in operations/ service delivery hence reducing costs. For instance, in 2016 Co-operative Bank of Kenya reported that increased use of mobile banking, applications and internet banking had helped the bank increase its pretax profit in the first half of 2016 by 19 percent to 10.45 billion shillings (\$103.08 million). The bank also reported that operational efficiencies resulting from these projects had seen the Cost-to-Income Ratio improve from 58.8% in December 2015 to 51.4% in June 2016 (Co-operative Bank Financial Report, 2016).

2. STATEMENT OF THE PROBLEM

The banking system needs to identify the sources of the several financial risks which emanates from their products and services, as these risks have an impact on bank stability (Cecchetti & Schoenholtz, 2011). Financial innovations, even though beneficial to commercial banks, may amplify risks (Gennaioli, Andrei & Robert, 2012). They are blamed for banks taking excessive risks, and for a general erosion of lending standards leading to the financial risks. Empirical evidence from studies by Keys, Mukherjee, Seru & Vig, (2010) and Gennaioli *et al.* (2012), show that rise in financial innovations in the banking industry give rise to risks. In Kenya, commercial banks are increasingly adopting various financial innovations such as RTGS, cards electronic payment/transactions, internet banking, mobile banking and agency banking. Some of these new innovations have been found to expose the bank and the consumers to risks (Korir, Sang, Shisia & Mutung'u, 2015). For instance, the recent switch from magnetic strip ATM cards to the new Chip-Pin faced cards was so to mitigate banking fraud through that channel; which implies that ATMs as a financial innovation might have exposed the banks to risks. This is just a one scenario, but it shows the possibility of financial innovations exposing commercial banks to risks. A report by CBK (2011) revealed that even though 94% of commercial banks indicated that they were complying with risk management guidelines, 95% of commercial banks were concerned with risk (CBK, 2011). With the advent and adoption of new financial innovations, which some empirical evidence show they give rise to risks; there is need to establish to what extent the adopted innovations expose commercial banks in Kenya to risks.

A review of local studies shows most of the studies have concentrated on the relationship between financial innovations and performance of banks in Kenya with little emphasis on the relationship between financial innovations and financial risks in commercial banks. For instance Korir *et al.* (2015) conducted a study on financial innovations and performance of commercial banks in Kenya; Muiruri and Ngari (2014) also did a study on the effects of financial innovations on the financial performance of commercial banks in Kenya while Nyathira (2012) conducted a study on financial innovation and its effect on financial performance of commercial banks in Kenya. No notable study has been conducted to establish the relationship between financial innovation and risk in commercial banks in Kenya. It is against this background therefore that the study sought to establish the relationship between financial innovations and financial risks in commercial banks in Kenya.

3. OBJECTIVE OF THE STUDY

To establish the influence of financial innovations on levels of risks in commercial banks in Kenya

The study was guided by the following research objectives;

- i. To determine the influence of internet banking on level of risks in commercial banks in Kenya.
- ii. To examine the influence of mobile banking on level of risks in commercial banks in Kenya.
- iii. To establish the influence of agency banking on level of risks in commercial banks in Kenya.
- iv. To determine the influence of electronic cards on level of risks in commercial banks in Kenya.

4. THEORETICAL REVIEW

This section discusses the theories that are established by other authors and scholars and which informs the concept of financial innovations and financial risks. The study is being guided by Silber's Constraint Theory of Innovation, Merton's Market Efficiency Theory of Innovation, Bank-led Theory and Bank-focused Theory.

4.1 Silber's Constraint Theory of Innovation

Silber (1975) attributes financial innovations to attempts by profit maximizing firms to reduce the impact of various types of constraints that reduces profitability. The theory points out that the purpose of profit maximization of financial institutions is the key reason of financial innovation. Silber notes that there are some restrictions (including external handicaps and internal handicaps such as organizational management) in the process of pursuing profit maximization. Although these restrictions not only guarantee the stability of management they reduce the efficiency of financial institution so the institutions strive to cast them off. Silber defines the particular conditions that will enable the emergence of a financial innovation (dividing them into instruments and practices), such as the arrival or imposition of an exogenous constraint. He discerns two kinds of constraint: a possible reduction of firm's utility, hence a new tool is required to bring it back to its previous level of utility 'abnormally' high (success innovation) (Silber, 1975). He considers as the main historical causes of innovation by US banks as a response to a reduction of their utility or adversity innovation: the interest rate ceiling, where banks tried to endogenize exogenous items of their balance sheet (Certificate of Deposit, Eurodollars and bank-related commercial paper); the decline in the markets for particular assets (introduction of long term loans from commercial banks during the 1930s); a declining growth rate of sources of funds (new products in order to attract new funds) and an increase of the risk of a particular asset or of all assets due to the economic environment (interest on the other hand, examples of 'success innovations' are the extensive use of cost reducing information technology and elaborate new finance theories in the financial sector and several new products designed to cope with the rising yield of assets in order to attract new funds, summarizing Silber's contribution in comparison with other contributions) (Llewellyn, 2009).

He proposes that the three possible ways a financial firm could innovate are: by endogenizing an exogenous item of the balance sheet, introducing an existing financial instrument from another country or industry into the firm's portfolio and thirdly as the mixture of the above two ways, taking the form of a modification of an existing instrument (Anderloni & Bongini 2009). Research literature has shown that firms that are less profitable in their respective sector are disproportionately innovative. Moreover, their decrease in profitability, which can be attributed to external competition or government regulation, has provided these firms with the necessary motivation to innovate in a bid to increase profitability. This finding is consistent with the suggestion in the work of Silber that investment in innovation is a rational response to an unfavorable competitive position (Tufano, 2003).

4.2 Merton's Market Efficiency Theory of Innovation

Merton (1990) also provides a valuable rationale for financial innovation. His theory is based on the notion that financial innovations are motivated by forces designed to increase market efficiency and improve social welfare. Merton argued that the market is not perfect hence financial institutions must innovate to improve market efficiency. According to Rene (2000) financial economists generally view the flow of funds to take advantage of investment

opportunities and financial innovations as positive forces that makes markets more efficient, facilitate risk sharing and increase growth. Many have argued that capital flows and financial innovations lead to instability, crashes and other disasters especially the 1987 crash and the derivative disasters in the 1990's but Merton was not convinced that financial innovation was to blame for the crashes. Merton (1990) gives three motivations for producing innovations namely, the creation of new financial structures that allow risk sharing, risk pooling and hedging as well as new financial structures for transferring resources, the improvement of economic efficiency and liquidity and reduction of agency costs.

4.3 Diffusion of Innovation Theory

Diffusion of Innovation Theory was developed by E.M. Rogers in 1962. The theory seeks to explain how, why, and at what rate new ideas and technology spread. Rogers argues that diffusion is the process by which an innovation is communicated over time among the participants in a social system. Rogers defines diffusion as “the process in which an innovation is communicated thorough certain channels over time among the members of a social system” (Rogers, 2003). Diffusion research has focused on five areas: the characteristics of an innovation which may influence its adoption; the decision-making process that occurs when individuals consider adopting a new idea, product or practice; the characteristics of individuals that make them likely to adopt an innovation; the consequences for individuals and society of adopting an innovation; and communication channels used in the adoption process (Rogers, 2003). Rogers proposes that four main elements influence the spread of a new idea: the innovation itself, communication channels, time, and a social system. This process relies heavily on human capital. The innovation must be widely adopted in order to self-sustain. Within the rate of adoption, there is a point at which an innovation reaches critical mass. The information flows through networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt a new information medium, such as the Internet. Opinion leaders exert influence on audience behavior via their personal contact, but additional intermediaries called change agents and gatekeepers are also included in the process of diffusion (Moseley, 2004). A number of studies (for example, Kemal, 2009; Akhavein, Frame and White, 2005) have been conducted about the diffusion of financial innovations. Diffusion research centers on the conditions which increase or decrease the likelihood that a new idea, product, or practice will be adopted. This study therefore informs the concept of adoption of financial innovations in the banking sectors in Kenya; and it helps understand those factors that increase or decrease the likelihood of adoption.

5. CONCEPTUAL FRAMEWORK

A conceptual framework conceptualizes the relationship between variables in the study and shows the relationship graphically or diagrammatically. The conceptual framework in Figure 1 shows the interaction between independent variables and the dependent variable in the study. The independent variables are: internet banking, mobile banking, agency banking while dependent variable is financial risks.

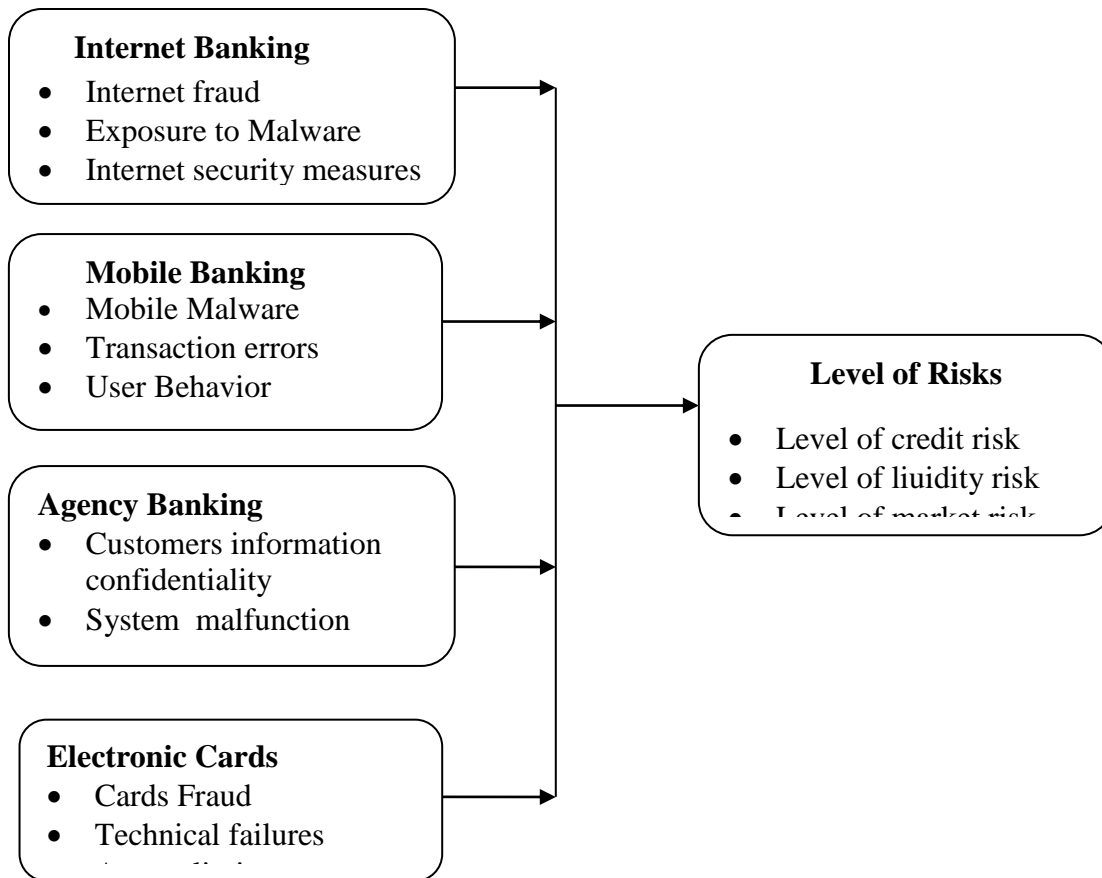


Figure 1: Conceptual Framework

6. METHODOLOGY

The research design the study used was descriptive in nature. The target population was all the 42 commercial banks registered with CBK as at December 31st 2016 (CBK, 2016). The unit of observation was the risk management managers, one from each of the 42 commercial banks. The study was a census study. The study collected both primary data and secondary data. The primary data was collected from the respondents through a questionnaire. Each questionnaire was accompanied by a cover letter providing explanations and assurances that all individual responses was treated with confidentiality. The coded data was entered in the Statistical Package for Social Sciences (SPSS) Version 21 which also aided in the data analysis. Regression analysis was used to relationship between the variables. The regression analysis also helped test the hypothesis.

7. STUDY FINDINGS

A regression was conducted to determine the relative significance of financial innovations (internet banking, mobile banking, agency banking, electronic cards) on levels of risks in commercial banks in Kenya.

Table 1: Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.812(a)	0.660	0.642	.24619

a Predictors: (Constant), Internet Banking, Mobile Banking, Agency Banking, Electronic Cards

The regression results in Table 1 shows an R- value of 0.812 which implies that there is high relationship between the variables. The Value of R square (coefficient of determination) was 0.642. This implies that financial innovations (internet banking, mobile banking, agency banking, electronic cards) explained 64.2% of risks in commercial banks in Kenya. The remaining percentage can be explained by other variable/predictors not included in the study.

Table 2: ANOVA(b)

	Sum of Squares	df	Mean Square	F	Sig.
Regression	9.062	4	2.265	37.378	.000(a)
Residual	4.667	77	.061		
Total	13.729	81			

a Predictors: (Constant), Internet Banking, Mobile Banking, Agency Banking, Electronic Cards

b Dependent Variable: Level of Risks

The ANOVA results show the significance of the regression model from which an F-value (F=37.378) and significance p-value=0.000 ($p < 0.001$) were established. This shows that the regression model has a 0.001 (0.1%) probability of giving a wrong prediction. This therefore means that the regression model has a confidence level of over 95% hence high reliability of the results.

Table 3: Regression Coefficients(a)

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.564	0.408		1.382	0.171
Internet Banking	0.449	0.094	0.359	4.763	0.000
Mobile Banking	0.465	0.097	0.372	4.794	0.000
Agency Banking	0.404	0.056	0.568	7.203	0.000
Electronic Cards	0.115	0.047	0.172	2.475	0.016

a Dependent Variable: Level of Risks

The regression co-efficient results show that positive and significant relationship between internet banking and level of risks in commercial banks in Kenya as shown by $\beta = 0.449$, $p = 0.001 < 0.05$. The results further shows a there is a positive and statistically significant association between mobile banking and level of risks in commercial banks in Kenya as shown by $\beta = 0.465$, $p = 0.001 < 0.05$. In addition, the results show a statistically significant relationship between level of risks and two forms of financial innovations - agency banking ($\beta = 0.404$ and $p = 0.001 < 0.05$),

electronic cards ($\beta=0.115$, $p=0.016<0.05$). From the results, it can be deduced that all the four forms of financial innovations in the commercial banks, that is, internet banking, mobile banking, agency banking, and electronic cards have a positive influence on the level of risks in commercial banks in Kenya. This implies that they may increase risks in the banks.

8. CONCLUSIONS

The study concludes that adoption of financial innovations raises great security concerns about phishing, hacker attacks, malware and other unauthorised activity, viruses and privacy issues that sometimes cause glitches while using the system, which in some instances cause delays, defrauding of clients and mass confusion. The study also concludes that the adoption of financial innovation by commercial banks requires the incorporation of sound risk management principles/measures for it to be effective. The study concludes that mobile and agency banking among commercial banks in Kenya for example, face technological costs such as network vulnerabilities, system failure, software defects and operating mistakes, system failure, transaction errors and data loss due to virus thus exposed the customers to risks. Most banks in Kenya had however made attempts to manage the risks by ensuring that the information of customers transacting through agency and mobile banking was kept confidential for any fraud activity. The study further concludes that financial innovations have exposed commercial banks in Kenya to various risks including credit risk, liquidity risk and risk and all these risks should therefore inform overall risk management of the various banks through a realistic risk index factor at any one period.

9. RECOMMENDATIONS


The main concerns raised by the respondents on challenges in the adoption of financial innovations included lack of customer trust and confidence, fraud, security, network failure and lack of knowledge among customers. The study therefore recommends that the banks should come up with innovative ways of measuring the impact of agency/mobile banking on different operations and develop the necessary contingency plans. The regulator should also closely monitors the banking sector and strictly enforces compliance with the agent/ mobile banking guidelines, while the banks continuously ensure careful vetting of agents. The study recommends that the banks should adopt more robust risk mitigation practices and policies to ensure that the risks emanating from the use of this financial innovations are significantly reduced/managed.

REFERENCES

- Akhavein, J. Frame, W.S. and White, L. J. (2005). The Diffusion of Financial Innovations: An Examination of the Adoption of Small Business Credit Scoring by Large Banking Organizations. *The University of Chicago Press Journal: The Journal of Business*, 78 (2), 577-596.
- Anderloni, L., & Bongini, P. (2009). *Is financial innovation still a relevant issue?*. In: Anderloni L, Llewellyn DT, Schmidt R (eds) *Financial innovation in retail and corporate banking*, Edward Elgar, UK.
- Balteş N., Ciuhureanu A. T. (2010). Study on the Risk Management in Banking Institutions, *Studies in Business and Economics*, 5 (3), 67-78.
- Banks E. (2005). *Liuidity Risk. Managing Asset and Funding Risk*, Palgrave Macmillan, New York.
- Beck, T., Chen, T., Lin, C. and Song, F. (2012). *Financial Innovation: The Bright and the Dark Sides*, Working Papers 052012, Hong Kong Institute for Monetary Research.

- Brunnermeier, M. & Markus, K. (2009). Deciphering the liquidity and credit crunch 2007-2008. *Journal of Economic Perspectives* 23, 77-100.
- Cecchetti, S.G., & Schoenholtz K. L. (2011). *Money, banking, and financial markets* (3rd ed.). McGraw-Hill Education, New York
- Central Bank of Kenya (2011). *Risk Management Survey for the Banking Sector*. Retrieved from: https://www.centralbank.go.ke/uploads/banking_sector_reports
- Central Bank of Kenya report (2015): <http://www.centralbank.go.ke>
- Ciciretti, R., Hasan, I., & Zazzara, C. (2009). Do internet activities add value? Evidence from the traditional banks. *Journal of Financial Services Research*, 35(1), 81-98.
- Frame W. S., & White L. J. (2012). *Technological change, financial innovation and diffusion in banking*, in Berger A.N., Molyneux P. and Wilson J.O.S. (eds), *The Oxford Handbook of banking*.
- Frame, W. S., & White, L. (2009), *Technological change, financial innovation, and diffusion in banking*, Federal Reserve Bank of Atlanta Working Paper 2009-10, March.
- Gennaioli, N., Andrei, S. and Robert V. (2012). Neglected risks, financial innovation, and financial fragility. *Journal of Financial Economics* 104, 452-468.
- Greuning, H.V. & Bratanovic, S.B. (2009). *Analyzing and Managing Banking Risk: A Framework for Assessing Corporate Governance and Financial Risk*. Washington, D.C, The World Bank.
- Hasan, I., Maccario, A., and Zazzara, C. (2012), “Do Internet Activities Add Value? The Italian Bank Experience”, Working Paper, Berkley Research Center, New York University.
- Henderson, B. J., and Pearson, N. D. (2011). The dark side of financial innovation: a case study of the pricing of a retail financial product. *Journal of Financial Economics*.
- Keys, B.J., Mukherjee, T., Seru, A., & Vig, V., (2010). Did securitization lead to lax screening? Evidence from subprime loans. *Quarterly Journal of Economics*.
- Laeven, L., Ross L., and Stelios, M. (2011), Financial innovation and endogenous growth.
- Lerner, J., & Tufano P. (2011). *The Consequences of Financial Innovation: A Counterfactual Research Agenda*, NBER Working Paper 16780, February.
- Llewellyn, D.T. (2009). *Financial innovation and the economics of banking and the financial system*. In: Anderloni L, Llewellyn DT, Schmidt R (eds) *Financial innovation in retail and corporate banking*, Edward Elgar, UK.
- Ma, . (2009). Financial innovations and risks in the financial system. *Paper presented at The 2nd GEP Conference in China, The Global Financial Crisis*, 10-11 November 2009. University of Nottingham Ningbo, China.
- Malhotra, P. & Singh, B. (2009). The Impact of Internet Banking on Bank Performance and Risk: The Indian Experience. *Eurasian Journal of Business and Economics*, 2 (4), 43-62.
- Merton, R. C. (1990). The Financial Systems and Economic Performance. *Journal of Financial Services research*
- Moseley, S.F. (2004). Everett Rogers’ diffusion of innovations theory: Its utility and value in public health. *Journal of Health Communication*. 9(1), 149-151.
- Mwangi, M. K. (2007), *Factors influencing financial innovation in Kenya’s securities market*. Unpublished MBA project, University of Nairobi.
- Norden, L., Buston, C. & Wagner, W. (2014), 'Financial innovation and bank behavior: Evidence from credit markets', *Journal of Economic Dynamics and Control*, 43 (1), 130-145.
- Rogers, E.M. (1962). *Diffusion of Innovations*. New York: Free Press.

- Rogers, E.M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press
- Silber, W. (1975), *Financial Innovation*, Lexington Books, Lexington MA.
- Silber, W. (1983). The process of Financial Innovation. *America Economic Review papers and proceedings*, 73, 89-95.
- Silber, W.(1975),“Towards a theory of Financial Innovation .In *Financial Innovation*, Edited by William L Silber, Lexington mass DC Health.
- Sumra, S. H., & Manzoor, M. K. (2011). The impact of E-Banking on the profitability of banks: a study of Pakistani public sector banks. *Journal of Public Administration and Governance*, 1(1), 31-38.
- Tufano, P. (2003). Financial innovation: the last 200 years and the next. In *The Handbook of the Economics of Finance*, edited by George M. Constantinides, Milton Harris and René M. Stulz.

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