**FINANCIAL ENGINEERING AND FINANCIAL PERFORMANCE OF DEPOSIT TAKING SAVINGS AND CREDIT CO-OPERATIVE SOCIETIES IN KENYA**

**Authors:**

**KIPROTICH CHRLES BII – UNIVERSITY OF NAIROBI, KENYA**

**DR. ONSOMU N.Z. – UNIVERSITY OF NAIROBI, KENYA**

**(corresponding** [**author-zonsomu@uonbi.ac.ke**](mailto:author-zonsomu@uonbi.ac.ke)**, +254720762183, P.O Box 41972,80100, MOMBASA, KENYA**

**Financial Engineering and Financial Performance of Deposit Taking Savings and Credit Co-operative Societies in Kenya.**

**ABSTRACT**

The study explores the effect of financial engineering on financial performance of deposit taking Savings and Credit Co-operative Societies (SACCOs) in Kenya. Population constituted of 163 SACCOs and a sample of 45 was considered. The results depicted that SACCOs have adopted financial engineering practices in three forms: product engineering, process engineering and financial solutions engineering. In terms of their effect on performance, only process engineering was found to have a positive and significant relationship with financial performance. Product engineering and financial solutions engineering were found to have a positive but insignificant relationship was obtained. The study recommends that SACCOS should adopt financial engineering practices so as to improve their performance. More focus should be on process engineering. As such, SACCOs should automate their operations, adopt paperless services, use mobile banking services platform, use electronic funds transfer and install ATMs so as to improve their performance.

*Keywords: Financial engineering, Product engineering, Process engineering, financial solutions engineering, financial performance.*

**1. Introduction**

Financial engineering means creating non-existing better products and services in finance through innovation with regard to financial instruments (Osuoha, 2013). According to Swailem (2000), it is about designing, developing and implementing tools and innovative financing mechanisms, as well as working out creative solutions to financing problems. According to Ibrahim (2013) it is application of instruments in finance especially derivatives and other closely linked products that helps in the restructuring of cash flows to achieve certain financial objectives including the need to manage risks in finance. The area of ​​application of financial engineering comprises three areas such as innovativeness in securities, improving financial processes and developing solutions to issues in company finance (Sayyed, 2015). The role of financial engineers is therefore to give solutions to finance-related problems and help institutions to take advantage of new finance-related business opportunities.

Several empirical studies have been done in various financial markets. Abir and Chokri (2010) conducted an assessment on how financial innovations affect financial liberalization in the banks in Tunisia. This research adopted a descriptive survey design. The study included an analysis of the acceptance of new approaches and processes in finance in the Tunisian banking sector over the period 1987 to 2008. The study therefore concluded that the legal framework greatly influenced the innovation behavior of the Tunisian banking system.

Ibraheem (2013) conducted a survey of Egyptian commercial banks to front a discussion on the aspects and significance of financial engineering. The study was based on the hypothesis that financial engineering affects guidelines on finance, development of new products and to reduce possible losses. The findings depicted that financial engineering offers new sources of finance. In this way, companies have been given the opportunity to design instruments that enable them to respond to the diverse needs of investor groups and reduce financial opportunity cost.

Oksana and Alexander (2013) studied dissemination of innovations by banks with respect to bank cards in the Russian market. The study aimed at assessment of ability of Russian banks to accept and adopt new improvements. This research used the case of cards used the market in Russia as a new approach to access banking services. Data for this study was collected from 118 banks in Russia that had differences in terms of their profit making where they are located, how they are oriented and their size during the period between the years 2005 and 2010. It was established that there exists an environment of inventions and improvement of financial products and services due to high competition in the Russian market.

Sayyed (2015) conducted a review of how financial engineering affects the world of finance. The objective of the study was to identify ways in which financial threats can be understood through financial engineering and be provided with an effective solution as well as how an organization can benefit from the use of financial engineering. The research adopted a qualitative research approach through collection of data from relevant publication on past. Secondary data was derived from the literature review section. The paper presented views regarding the use of financial engineering as a mechanism of improving management efficiency. This according to the study improves the productivity of organizations.

Al-Jilani (2016) undertook a study on how application of financial engineering in Islamic finance minimizes global crisis financially in Islamic banking. The study aimed to conduct an examination of how application of Islamic financial engineering minimizes financial-related problems worldwide. The research was based on reviewing literature regarding past studies on financial crisis events and analysis of the differences between traditional and Islamic operational banks. The study was contextualized in Arab countries. The researcher carried out a comprehensive survey in books and magazines of Arab Islamic banks. The results showed that financial engineering lead to reduced financial crises in Islamic banks.

Iman, Sharul and Azam (2019) studied how the use of financial engineering affect the performance of firms financially by commercial banks in Iraq. This research focused on examining how financial engineering and performance of commercial banks relate financially. The data was analyzed using structural equation method via Smart PLS 3.0 to examine how the performance of commercial banks in Iraq relate to financial engineering. It was established that approaches used in investment and how companies perform financially are positively related.

Locally, Cherotich, Sang, Shisia and Mutung’u (2015) studied how improved products and services in financial services affect how commercial banks perform financially in Kenya. The study relied on secondary data and 44 commercial banks were studied. The research established that improving financial products and services relate closely with how the banks perform financially. It concluded that improving products and services in financial markets positively affect the extent of how banks perform financially. On the basis of these findings, the study recommended providing information on financial innovation from regulation point of view.

Ngure, Maina and Kariuki (2017) examined the impact of coming up with new products in finance and how it affects how SACCOs perform financially in Kenya. Cross-sectional descriptive survey design was adopted in this work. This research targeted sixty (60) SACCOs that are incorporated and operate in Kirinyaga County. Data was primarily gathered through the use of a structured questionnaire. Secondary data was extracted by analyzing the published financial information. Findings indicated a positive correlation between invention and use of new financial products and improved performance financially.

Ouma, Omagwa and Ngaba (2018) conducted a study on how invention and improvement of financially-related products and services lead to improved performance of deposit taking SACCOs in Nairobi County, Kenya. The study targeted all the SACCOs in the county as permitted to operate by SASRA between 2010 and 2014. To estimate the relationship between the variables, a multiple regression analysis was adopted and then a description of the data was done using the measures of central tendency and dispersion. It was found that coming up with new financial products, services and approaches affect how SACCOs perform in a significant way in Nairobi County, Kenya. In their recommendations, SACCOs should introduce financial innovation strategies to increase the efficiency of their overall business, increase profitability and increase market share.

# 1.1 Research Problem

Financial engineering ensures a reliable financial structure for effective intermediation. It helps to regulate financial flow among financial players and to deal with cases of information gaps between the stakeholders (Chavan & Somanadh, 2011). Financial engineering offers new ways to perform many activities better at each operational level. The basis of adopting financial engineering is to improve financial service provision, increase the number of investment vehicles and enhance operational efficiency. However, the adoption exposes firms to financial risks such as fraud and also the cost of implementation. As such, adopting financial engineering practices may not necessarily lead to better performance.

Quite a number of academic research have been done regarding financial engineering. Ibraheem (2013) found that financial engineering offers new sources of finance. In this way, companies have been given the opportunity to design instruments that enable them to respond to the diverse needs of investor groups and reduce financial opportunity cost. Cherotich, Sang’, Shisia and Mutung’u (2015) found out that improve financial products and processes lead to commercial banks performing better financially. Al-Jilani (2016) on the other hand found out that financial engineering reduces financial crises in Islamic banks. Ngure, Maina and Kariuki (2017) established new products and services through financial engineering lead to improved achievements by SACCOs in Kirinyaga County financially. Ouma, Omagwa and Ngaba (2018) concluded that product and service innovation significantly influence how SACCOs in Nairobi County perform. Sayyed (2015) equally found out that financial engineering lead to organizational growth and efficiency. Finally, the study by Felix, Rebecca and Onyeisi (2015) established that financial engineering positively affects the growth of the market from a financial perspective.

The aforementioned studies have helped to establish conceptual and contextual gaps. The study by Ibraheem (2013) has a contextual gap due to its focus on commercial banks and not the SACCOs. Cherotich, Sang’, Shisia and Mutung’u (2015) focused on new products in finance as well as services with a focus on commercial banks. The study by Al-Jilani (2016) focused on the context of Islamic banks. The study by Ngure, Maina and Kariuki (2017) has a conceptual and contextual gap in that it focused on product innovation which is only an element in financial engineering in Kirinyaga County. This research aims to address the gap by answering the question. ‘How does financial engineering affect deposit taking SACCOs in terms of their performance financially in Kenya?’

**1.2 Research Objective**

To determine the effect of financial engineering on financial performance of deposit taking Savings and Credit Co-operative Societies in Kenya.

# 2.0 Theoretical Review

The study outlines four theoretical foundations. Innovation Diffusion Theory, Modern Hedging Theory, Modern Portfolio Theory (MPT), and Constraint-Induced Financial Innovation Theory.

## 

## 2.1 Diffusion of Innovation Theory

The theory was put forward by Rogers (1962). The theory gives an explanation on regarding the spread of information about new goods, services and approaches in a given set up. The basis of the theory is that information about new inventions tend to spread overtime as firma adopt them to remain relevant in competition. The implication is that people eventually starts to replace old approaches with the new inventions. The diffusion is made possible after people have accepted the products, idea or service as new in comparison with the previously existing ones. According to Jdanova and Karminsky (2013) innovation is any thinking or involvement that did not exist initially while innovation as disseminated is the process by which new products, services, and ideas are communicated through channels over time in the systems. As per the theory, the basis of innovation is that the innovation will be regarded as an improvement and then adopted in the entire organization.

In its application, Wani and Ali (2015) posit that through financial engineering, there is emergence of new financial securities helping to address changing industrial requirements. The essence of diffusion is that the industry is not persuaded by the new inventions but find it a necessity to deal with changing needs and business environmental circumstances. The argument is that it’s about new products and services that get to be adapted overtime within the market due to diffusion (Les Robinson, 2009). This is because, the spread of information on new products, services and approaches enters the market, get to be known and then other individuals and businesses starts to use them to stay afloat in competition. The theory helps to explain how innovation diffuse across the industry to improve product and service delivery by the SACCOs institutions (Hernadez & Mazzon, 2006). It is generally based on the premise that when due to competition, a new practice by one firm would be adopted and used by the others so that they remain relevant and competitive especially where profitability would be affected (Philippas & Siriopoulos, 2012).

## 2.2 Modern Portfolio Theory

This proposition was advanced by Markowitz (1952). It asserts that reasonable and investment-conscious investors should always use diversification to optimize their portfolios and evaluate how a risky asset should be valued. The aim is to establish the balance between maximizing return and minimizing risk. The central premise of this theory is that investments in a portfolio must not be selected based on individual merits but rather the effect of changes in price of an investment on another in the portfolio must be considered. Essentially it is all about establishing a tradeoff between risk and expected return. MPT thus holds that investors who make most out of the market are those willing to assume higher risks. Lewis, Michael and Einhorn (2009) opines that once investors accept that greater returns come from securities with greater risks; that the risks of individual securities can be diversified away at the portfolio level; that returns are most meaningfully measured against market benchmarks and that derivatives can be meaningfully priced, then organizations are virtually forced to seek out risky products in order to maximize their returns relative to their rivals. This drives product and process innovations through financial engineering.

MPT has changed the face of investment as organizations inevitably and dramatically increase the demand for risky products in the financial markets. The essence is that financial engineering enhances diversification in the financial products and services of the SACCOs that helps in risk reduction as well as improved financial performance. According to Omisore, Yusuf and Nwufo (2013) innovations creates other securities giving investors an opportunity to spread their investments among many investment vehicles. The argument is that value-maximizing companies hedge against the likelihood of financial problems through product and service diversification (Philippas & Siriopoulos, 2012)

## 2.3 Constraint-induced Financial Innovation Theory

The theory was advanced by Silber (1983). It posits that as the organization pursue profit maximization some restrictions such as policy and managerial problems arise. These problems affect how efficient the organizations are to the extent of interfering with their ability to develop new products, services and processes overtime. The theory further argues that growth is also driven by entrepreneurial mindset through innovation and application of technology (Nyathira, 2012). Financial engineering therefore gives an organization an opportunity to shed off its strategic problems and realign internal operations for improved financial performance. It gives an organization some competitive edge and meet consumer and market demands on an effective basis. Abir and Chokri (2010) posit that the problems that organizations face in coming up with new business approaches forms the basis of financial engineering by the micro finance institutions.

SACCOs operate in an industry with stricter regulations meaning that they deal with circumstances including reduced profit environment and managerial difficulties as well as unfavorable Government policies. Financial engineering is therefore motivated by the need to increase revenues and survive the harsh Government regulations (Abir & Chokri, 2010). Financial engineering also relies on the changes that take place in the society as a driver for socio-economic growth. In a bid to maximize profits, financial institutions, including SACCOs face a number of restrictions and constraints poised by rivalry and regulations. The essence of financial engineering therefore is to ensure that these constraints are handled in such a way that operational sustainability and profitability can be realized (Lerner & Tufano, 2011).

# 3.0 Research Methodology

The research employed a descriptive cross sectional survey approach. The targeted population constituted of 163 SACCOs that are allowed to take deposits from the public in Kenya (SASRA, 2019). Purposive sampling was used and a sample of 45 SACCOs was selected. Data collection was through primary and secondary sources. Primary data was collected from SACCO managers through the use of self-administered questionnaire. Secondary data was extracted from accounting reports and websites of the SACCOs. Data was analyzed using SPSS was used to generate inferential and descriptive statistics. The following regression model was used:

***Y =a+ β1X1 + β 2X2 + β3X3 + β4X4 + β5X5 +*** *ε…………………………………………………. (i)*

**Where:**

Y = Financial Performance (Dependent variable).

a = Constant

β1, β2 and β3 = Coefficient of Independent variables

β4 and β5 = Coefficient of Control Variables

X1= Product Engineering

X2= Process Engineering

X3 = Financial Solutions Engineering

X4= Total loans (control variable)

X5 = size of the firm (control variable measured as total assets)

ε = Error term.

The t-test was employed to ascertain the significance level of the regression coefficients while the F-test was used to test the suitability of the regression model.

## Operationalization of Study Variables

Operationalization of study variables helps to reduce the abstractness of the variables under study into observable and measurable characteristics and to facilitate the determination of any relationship among them. The variables for this study included financial engineering activities representing independent variables and financial performance that represent dependent variable. The operationalization was as given in Table 1:

**Table 1: Operationalization of Study Variables**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Indicators** | **Operational Definition** | **Scale** | **Questionnaire** | **Supporting Literature** |
| **Dependent Variables**  **Financial Performance** | * Profitability. * Liquidity | Earnings before interest and tax  Liquidity ratio computation | Ratio | * **Appendix II** * Data Collection Sheet | Miriti (2014)  Kiama (2014)  Saleh & Zeitun (2007 |
| **Independent Variables** | * Debit Cards * Credit Cards * New Deposit Accounts | The coming up with new financial products and services. | Ratio | PART B  Question 1 – 15 | Veernaik (2016)  Ibraheem (2013)  Neeraj (2011) |
| Product Engineering |
| Process Engineering | * Mobile Banking * ATMs * EFTs | The improvement of operational processes. |
| Financial Solutions Engineering | * Cash Management System * Debt Management System * New Financial Structures | Coming up with new ways of solving financial-related problems. |
| **Control Variable**   * Size of the SACCO * Cost of Operations | * Membership of the SACCO * Salaries paid * Rent Rate * Interest on member deposits * Training costs | The size of the membership improves the financial sources of the SACCO | Ratio | * PART A * Question 4 & 5 | Miriti (2014) |

**Source:** Research Data (2019)

## 3.2 Test of Significance

The t-test was employed to help in the determination of how significant each variable under study was while an F-test was established to test the suitability of the regression model.

# 4.0 Results

## 4.1 Adoption of Financial Engineering Practices

The respondents were asked to indicate the extent to which the SACCOs have adopted the financial engineering practices based on product engineering, process engineering and financial solutions engineering. The analysis was based on a scale of 1 to 5 where 1 =Very low, 2=Low, 3=Moderate, 4=High, 5= Extremely high. The findings are as expressed in the Table 2, 3 and 4:

Table 2 shows that on average, the SACCOs adopt product engineering practices to a high extent with a mean of 3.95. Specifically, the mostly adopted practice include the increase in FOSA activities, then the existence of investment clubs in real estate followed by the use of credit and debit cards with a mean of 4.0444, 3.9778 and 3.9556 respectively. The SACCOs also invest in government bills and bonds with a mean of 3.8667. The findings imply that from a general perspective the SACCOs adopt product engineering practices through financial innovations.

**Table 2: Product Engineering Practices**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Practice** | **N** | **Mean** | **Std. Deviation** |  |
| The SACCO has come up with investment clubs in areas such as real estate. | 45 | 3.9778 | .94120 |  |
| There are investment clubs for members through registration. | 45 | 3.9556 | .82450 |  |
| The SACCOs have credit and Debit cards for account holders. | 45 | 3.9111 | .90006 |  |
| There is increased FOSA activities. | 45 | 4.0444 | .82450 |  |
| There is investment in government bills and bonds. | 45 | 3.8667 | .96766 |  |
| **Valid N (listwise)** | **45** | **3.95** |  |  |

**Source:** Research Data (2019)

Table 3 indicate the responses regarding adoption of process engineering activities. The findings show that the best adopted practice was the installation of ATMs to facilitate increased access to cash followed by the use of mobile banking platform for customers and the automation of SACCO operations with means of 4.0667 and 4 respectively. The SACCOs also adopted paperless services with the least practice being the use of electronic funds transfer as a mechanism of facilitating payments having a mean of 3.7556. The overall mean is 3.95 implying that SACCOs have adopted process engineering practices to a high extent in improving their financial performance.

**Table 3: Process Engineering Practices**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Practice** | **N** | **Mean** | **Std. Deviation** |  |
| There is automation of SACCO operations. | 45 | 4.0000 | .90453 |  |
| The SACCOs have adopted paperless services. | 45 | 3.9333 | .83666 |  |
| The SACCOs have adopted Mobile banking platform for customers. | 45 | 4.0000 | .79772 |  |
| The SACCOs use Electronic funds transfer as a mechanism of facilitating payments. | 45 | 3.7556 | .85694 |  |
| The SACCOs have installed ATMs to facilitate increased access to cash. | 45 | 4.0667 | .83666 |  |
| **Valid N (listwise)** | **45** | **3.95** |  |  |

**Source:** Research Data (2019)

Table 4 indicate analysis of responses regarding adoption of financial engineering solutions. The findings show that the most adopted financial solutions engineering practice was the new methods of cash management, followed by the use of new approaches in the management of debts and then the new investment strategies having means of 4.2, 4.1333 and 4.0889 respectively. The SACCOs also adopted enhanced insurance cover against loan defaults and the use of new approaches in risk management with means of 4.0667 and 4 respectively. The overall mean of 4.10 indicate that financial solutions engineering practices are adopted to a very high extent by the SACCOs. The implication is that SACCOs practice financial solutions engineering.

**Table 4: Financial Solutions Engineering**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Practice** | **N** | **Mean** | **Std. Deviation** |  |
| The SACCO have come up with new methods of cash management. | 45 | 4.2000 | .89443 |  |
| There is the use of new approaches in the management of debts. | 45 | 4.1333 | .86865 |  |
| The SACCOs have developed new investment strategies. | 45 | 4.0889 | .94922 |  |
| There is the use of new approaches in risk management. | 45 | 4.0000 | .76871 |  |
| The SACCO has adopted enhanced insurance cover against loan defaults. | 45 | 4.0667 | .78044 |  |
| **Valid N (Listwise)** | **45** | **4.10** |  |  |

**Source:** Research Data (2019)

# 4.2 Regression Analysis

Regression analysis was used to establish the relationship between financial engineering and financial performance. Total loans and size of the firm were used as control variables. The result indicated in Table 5 shows that the adjusted R2 is 0.962 implying that 96.2% of variations in financial performance of SACCOs is explained by the changes in financial solutions engineering, process engineering, total assets, product engineering and total loans.

**Table 5: Model Summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Model** | **R** | **R Square** | **Adjusted R Square** | **Std. Error of the Estimate** |
|
| 1 | .983a | .966 | .962 | .19464 |
| a. Predictors: (Constant), Financial Solutions, Process Engineering, Total Assets, Product Engineering, Total Loans | | | | |

### 4.2.1Analysis of Variance

The analysis of variance is given in the Table 6. The F-test has a p-value of <0.05 denoting that the model was significant. The implication is that financial solutions engineering, process engineering, total assets, product engineering and total loans reliably predict financial performance of SACCOs.

**Table 6: Analysis of Variance**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Model** | | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 41.528 | 5 | 8.306 | 219.233 | .000b |
| Residual | 1.440 | 38 | .038 |  |  |
| Total | 42.967 | 43 |  |  |  |
| a. Dependent Variable: Total Income | | | | | | |
| b. Predictors: (Constant), Financial Solutions, Process Engineering, Total Assets, Product Engineering, Total Loans | | | | | | |

# 4.2.2 Regression Co-efficients

Table 7 depicts the results of the regression coefficients. A positive and significant relationship was established between process engineering and financial performance. However, product engineering and financial solutions engineering were found to have a positive but insignificant relationship with financial performance. Total loans (control variable) was found to have a positive and significant relationship with financial performance.

**Table 7: Regression Coefficients**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Model** | | **Unstandardized Coefficients** | | **Standardized Coefficients** | **t** | **Sig.** | **Correlations** | | | **Collinearity Statistics** | |
| **B** | **Std. Error** | **Beta** | **Zero-order** | **Partial** | **Part** | **Tolerance** | **VIF** |
| 1 | (Constant) | -1.048 | .407 |  | -2.577 | .014 |  |  |  |  |  |
| Product Engineering | .060 | .077 | .029 | .772 | .445 | .305 | .124 | .023 | .613 | 1.630 |
| Process Engineering | .249 | .095 | .108 | 2.615 | .013 | .628 | .390 | .078 | .516 | 1.939 |
| Financial Solutions | .012 | .071 | .006 | .170 | .866 | .250 | .028 | .005 | .795 | 1.258 |
| Total Loans | .146 | .042 | .844 | 3.470 | .001 | .978 | .490 | .103 | .015 | 67.174 |
| Total Assets | .009 | .031 | .068 | .283 | .779 | .968 | .046 | .008 | .015 | 65.310 |
| a. Dependent Variable: Total Income | | | | | | | | | | | |

Based on the findings, the regression model can be stated as follows:

***Y = -1.048 + 0.060X1 + 0.249X2 + 0.012X3 + 0.009X4 + 0.146X5 +*** *ε…………………………..(ii)*

**Where:**

Y = Financial Performance (Dependent variable).

a = Constant

X1= Product Engineering

X2= Process Engineering

X3 = Financial Solutions Engineering

X4= Size of the SACCO

X5 = Total Loans

ε = Error term.

# 5.0 Conclusion and Recommendations

SACCOs have adopted financial engineering practices: product engineering, process engineering and financial solutions engineering in their operations. Financial engineering has an influence on financial performance of SACCOs. Specifically, adoption of process engineering practices can significantly improve the financial performance. As such, SACCOs should automate its operations, adopt paperless services, use mobile banking services platform, use electronic funds transfer and install ATMs. The findings are consistent with the research by Ouma, Omagwa and Ngaba (2018) who established that SACCOs adopt financial engineering and innovation practices to improve their performance. The amount of loans also affect the financial performance positively. Therefore, SACCOs should increase its loans but with caution so as to avoid non - performing loans which can affect its performance.

This study recommends that management of SACCOs should explore mechanisms for enhancing the use of process re-engineering particularly to old processes and products. This will not only revitalize their products and processes, but also act as a form of organizational branding that is essential for performance. There is also need to have the firms enhance customer care delivery channels in a manner that is consistent, less costly, and more agile. This can only be enhanced by use of process engineering within organizations. The firms should also change their management systems in order to improve service delivery to their customers. The firms should also undertake organization restructuring and external relation in order to reduce their operation costs and improve their financial performance.

# REFERENCES

[1] Abir, M., & Chokri, M. (2010). Is financial innovation influenced by financial liberalization? Evidence from the Tunisian banking industry. *Banks and Bank Systems,* 5(3), 97 – 111.

[2] Al-Jilan, M.H. (2016). The role of Islamic financial engineering in minimizing global financial crises results on Islamic banking. *Research Journal of Finance and Accounting,* 7, (2), 42-54.

[3] Cherotich, K. M., Sang, W., Shisia, A., & Mutung’u, C. (2015). Financial innovations and performance of commercial banks in Kenya. *International Journal of Economics, Commerce and Management;* III, 5, 1242 – 1265.

[4] Ebrahim, M.S., Hussain, S. (2010). Financial development and asset valuation: the special case of real estate. *Journal of Banking and Finance,* 34, 150-162.

[5] Ibraheem, H.A. (2013). Mechanisms of financial engineering as new alternatives. *Journal of Arts Science & Commerce,* IV, 3, 21 – 39.

[6] Iman, M. M. A., Sharul, E.B.J., & Azam, A.K.A (2019). The relationship between financial engineering and financial performance in Iraq commercial banks. *Journal of Advanced Research in Dynamical & Control Systems,* 2, 33-46.

[7] Kiragu, D. N. (2015). *Influence of financial innovations on financial performance of savings and credit co-operative societies in Nyeri County, Kenya. Nairobi*: University of Nairobi.

[8] Klein, M.W., Olivei, G.P. (2008). Capital account liberalization, financial depth, and economic growth. *Journal of International Money and Finance,* 27, 861-875.

[9] Milnes, A. (2006). What is in it for us? Network effects and bank payment innovation. *Journal of Banking and Finance,* 30, 1613-1630.

[10] Mutuku, B. M. (2014). *The Relationship Between Financial Innovation and Efficiency of Saccos in Kenya,* Unpublished Doctoral dissertation. Nairobi: University of Nairobi.

[11] Neeraj N. (2011). Role of financial innovation in reengineering business: *An Overview,* 28-30.

[12] Ngure, F. K., Kimani, E. M. & Kariuki, S. (2017). Product innovations and financial performance of savings and credit co-operatives societies in Kirinyaga County, Kenya. *International Academic Journal of Human Resource and Business Administration, 2*(3), 166-178.

[13] Oksana, R. J. & Alexander, K. (2013). The diffusion of banking innovations: bank cards on Russian market. *Innovative Marketing,* 9(3)

[14] Omisore. I., Yusuf .M & Nwufo C.I, (2012). The modern portfolio theory as an investment decision tool. *Journal of Accounting and Taxation,* 4(2), 19-28.

[15] Osuoha, J. (2013). *Commodity Trading and Futures.* Lagos: Emmaesth Printing & Publishing.

[16] Ouma, A.A., Job Omagwa, J., & Ngaba, D. (2018). Financial innovations and performance of deposit taking SACCOS in Nairobi city county, Kenya. *International Journal of Economics, Business and Management Research*; 2, 02.

[17] Sayyed, I. (2015). The effects and implications of financial engineering in the corporate world – a review. *International Journal of Engineering Research and Development;* 11, 12, 76-90.

[18] Swailem, S. (2000). Financial engineering industry: Looks at the Islamic approach. *Research Center*, 5.

# QUESTIONNAIRE

**QUESTIONNAIRE No:** .................... **Date.**...../....../2019

(Information provided will be highly confidential)

**PART A: BACKGROUND INFORMATION**

**NOTE:** Please tick appropriately or fill additional information in the space provided.

1. Which county is the SACCO registered?
2. Mombasa County [ ]
3. Nairobi County [ ]
4. How many members does your SACCO have?
5. Below 500 Members [ ]
6. 501 – 1000 Members [ ]
7. 1001 – 1500 Members [ ]
8. 1501 – 2000 Members [ ]
9. 2000 and above Members [ ]
10. Which one is the main operational cost of the SACCO (Tick only one option)
11. Salaries [ ]
12. Rent Rates [ ]
13. Interest on member deposits [ ]
14. Training [ ]
15. Advertising [ ]

Any other…………………………………………………………………………

**PART B: ADOPTION OF FINANCIAL ENGINEERING PRACTICES**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| The following are the financial engineering activities. Using a scale of 1 to 5 where 1 =Very low, 2=Low, 3=Moderate, 4=High, 5= Extremely high, please indicate what extend your company has adopted each of them. | | **What is the extent of your agreement?** | | | | |
| **Very Low** | **Low** | **Moderate** | **High** | **Extremely High** |
|  |  | **1** | **2** | **3** | **4** | **5** |
| **A** | **Product Engineering** |  |  |  |  |  |
| 1 | The SACCO has come up with investment clubs in areas such as real estate. |  |  |  |  |  |
| 2 | There are investment clubs for members through registration. |  |  |  |  |  |
| 3 | The SACCOs have credit and Debit cards for account holders. |  |  |  |  |  |
| 4 | There is increased FOSA activities. |  |  |  |  |  |
| 5 | There is investment in government bills and bonds. |  |  |  |  |  |
| **B** | **Process Engineering** |  |  |  |  |  |
| 6 | There is automation of SACCO operations. |  |  |  |  |  |
| 7 | The SACCOs have adopted paperless services. |  |  |  |  |  |
| 8 | The SACCOs have adopted Mobile banking platform for customers. |  |  |  |  |  |
| 9 | The SACCOs use Electronic funds transfer as a mechanism of facilitating payments. |  |  |  |  |  |
| 10 | The SACCOs have installed ATMs to facilitate increased access to cash. |  |  |  |  |  |
| **C** | **Financial Solutions Engineering** |  |  |  |  |  |
| 11 | The SACCO have come up with new methods of cash management. |  |  |  |  |  |
| 12 | There is the use of new approaches in the management of debts. |  |  |  |  |  |
| 13 | The SACCOs have developed new investment strategies. |  |  |  |  |  |
| 14 | There is the use of new approaches in risk management. |  |  |  |  |  |
| 15 | The SACCO has adopted enhanced insurance cover against loan defaults. |  |  |  |  |  |

# REFERENCES

Abir, M., & Chokri, M. (2010). Is financial innovation influenced by financial liberalization? evidence from the Tunisian banking industry. *Banks and Bank Systems,* 5(3).

Al-Jilan, M.H. (2016). The role of Islamic financial engineering in minimizing global financial crises results on Islamic banking. *Research Journal of Finance and Accounting,* 7, 2, 42-53.

Cherotich, K. M., Sang, W., Shisia, A., & Mutung’u, C. (2015). Financial innovations and performance of commercial banks in Kenya. *International Journal of Economics, Commerce and Management;* III, 5, 1242 – 1265.

Ebrahim, M.S., Hussain, S. (2010). Financial development and asset valuation: the special case of real estate. *Journal of Banking and Finance,* 34, 150-162.

Ibraheem, H.A. (2013). Mechanisms of financial engineering as new alternatives. *Journal of Arts Science & Commerce,* IV, 3, 21 – 39.

Iman, M. M. A., Sharul, E.B.J., & Azam, A.K.A (2019). The relationship between financial engineering and financial performance in Iraq commercial banks. *Journal of Advanced Research in Dynamical & Control Systems,* 11.

Kiragu, D. N. (2015). *Influence of financial innovations on financial performance of savings and credit co-operative societies in Nyeri County, Kenya. Nairobi*: University of Nairobi.

Klein, M.W., Olivei, G.P. (2008). Capital account liberalization, financial depth, and economic growth. *Journal of International Money and Finance,* 27, 861-875.

Milnes, A. (2006). What is in it for us? Network effects and bank payment innovation. *Journal of Banking and Finance,* 30, 1613-1630.

Mutuku, B. M. (2014). *The Relationship Between Financial Innovation and Efficiency of Saccos in Kenya,* Unpublished Doctoral dissertation. Nairobi: University of Nairobi.

Neeraj N. (2011). Role of financial innovation in reengineering business: *An Overview,* 28-30.

Ngure, F. K., Kimani, E. M. & Kariuki, S. (2017). Product innovations and financial performance of savings and credit co-operatives societies in Kirinyaga County, Kenya. *International Academic Journal of Human Resource and Business Administration, 2*(3), 166-178.

Oksana, R. J. & Alexander, K. (2013). The diffusion of banking innovations: bank cards on Russian market. *Innovative Marketing,* 9(3)

Omisore. I., Yusuf .M & Nwufo C.I, (2012). The modern portfolio theory as an investment decision tool. *Journal of Accounting and Taxation,* 4(2), 19-28.

Osuoha, J. (2013). *Commodity Trading and Futures.* Lagos: Emmaesth Printing & Publishing.

Ouma, A.A., Job Omagwa, J., & Ngaba, D. (2018). Financial innovations and performance of deposit taking SACCOS in Nairobi city county, Kenya. *International Journal of Economics, Business and Management Research*; 2, 02.

Sayyed, I. (2015). The effects and implications of financial engineering in the corporate world – a review. *International Journal of Engineering Research and Development;* 11, 12, 76-90.

Swailem, S. (2000). Financial engineering industry: Looks at the Islamic approach. *Research Center*, 5.

# 

# APPENDIX I: QUESTIONNAIRE

**QUESTIONNAIRE No:** .................... **Date.**...../....../2019

(Information provided will be highly confidential)

**PART A: BACKGROUND INFORMATION**

**NOTE:** Please tick appropriately or fill additional information in the space provided.

1. Gender
2. Male [ ]
3. Female [ ]
4. Education Level
5. Primary [ ]
6. Secondary [ ]
7. Tertiary [ ]
8. University [ ]
9. Others, specify………………………………………………………….
10. Which county is the SACCO registered?
11. Mombasa County [ ]
12. Nairobi County [ ]
13. When was the SACCO registered?
14. 0 – 5 Years [ ]
15. 6 – 10 Years [ ]
16. 11 – 15 Years [ ]
17. 16 – 20 Years [ ]
18. Above 20 Years [ ]
19. How many members does your SACCO have?
20. Below 500 Members [ ]
21. 5001 – 1000 Members [ ]
22. 1001 – 1500 Members [ ]
23. 1501 – 2000 Members [ ]
24. 2000 and above Members [ ]

**PART B: ADOPTION OF FINANCIAL ENGINEERING PRACTICES**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| The following are the financial engineering activities. Using a scale of 1 to 5 where 1 =Very low, 2=Low, 3=Moderate, 4=High, 5= Extremely high, please indicate what extend your company has adopted each of them. | | **What is the extent of your agreement?** | | | | |
| **Very Low** | **Low** | **Moderate** | **High** | **Extremely High** |
|  |  | **1** | **2** | **3** | **4** | **5** |
| **A** | **Product and Securities Engineering** |  |  |  |  |  |
| 1 | The SACCO has come up with investment clubs in areas such as real estate. |  |  |  |  |  |
| 2 | There are investment clubs for members through registration. |  |  |  |  |  |
| 3 | The SACCOs have credit and Debit cards for account holders. |  |  |  |  |  |
| 4 | There is increased FOSA activities. |  |  |  |  |  |
| 5 | There is investment in government bills and bonds. |  |  |  |  |  |
| **B** | **Process Engineering** |  |  |  |  |  |
| 6 | There is automation of SACCO operations. |  |  |  |  |  |
| 7 | The SACCOs have adopted paperless services. |  |  |  |  |  |
| 8 | The SACCOs have adopted Mobile banking platform for customers. |  |  |  |  |  |
| 9 | The SACCOs use Electronic funds transfer as a mechanism of facilitating payments. |  |  |  |  |  |
| 10 | The SACCOs have installed ATMs to facilitate increased access to cash. |  |  |  |  |  |
| **C** | **Financial Solutions Engineering** |  |  |  |  |  |
| 11 | The SACCO have come up with new methods of cash management. |  |  |  |  |  |
| 12 | There is the use of new approaches in the management of debts. |  |  |  |  |  |
| 13 | The SACCOs have developed new investment strategies. |  |  |  |  |  |
| 14 | There is the use of new approaches in risk management. |  |  |  |  |  |
| 15 | The SACCO has adopted enhanced insurance cover against loan defaults. |  |  |  |  |  |

**PART C: FINANCIAL PERFORMANCE**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Please indicate to what extent the following financial engineering lead to the profitability of the SACCO. Use a scale of 1 to 5 where 1 = Strongly Disagree, 2 = Disagree, 3 = Not Sure, 4 = Agree, 5= Strongly Agree | | **What is the extent of your agreement?** | | | | |
| **Strongly Disagree** | **Disagree** | **Not Sure** | **Agree** | **Strongly Agree** |
|  |  | **1** | **2** | **3** | **4** | **5** |
| **A** | **The following product and securities engineering leads to profitability of the SACCO** |  |  |  |  |  |
| 1 | The SACCO has come up with investment clubs in areas such as real estate. |  |  |  |  |  |
| 2 | There are investment clubs for members through registration. |  |  |  |  |  |
| 3 | The SACCOs have credit and Debit cards for account holders. |  |  |  |  |  |
| 4 | There is increased FOSA activities. |  |  |  |  |  |
| 5 | There is investment in government bills and bonds. |  |  |  |  |  |
| **B** | **The following process engineering activities leads to the profitability of the SACCO** |  |  |  |  |  |
| 6 | There is automation of SACCO operations. |  |  |  |  |  |
| 7 | The SACCOs have adopted paperless services. |  |  |  |  |  |
| 8 | The SACCOs have adopted Mobile banking platform for customers. |  |  |  |  |  |
| 9 | The SACCOs use Electronic funds transfer as a mechanism of facilitating payments. |  |  |  |  |  |
| 10 | The SACCOs have installed ATMs to facilitate increased access to cash. |  |  |  |  |  |
| **C** | **The following financial solutions engineering has led to profitability of the SACCO** |  |  |  |  |  |
| 11 | The SACCO have come up with new methods of cash management. |  |  |  |  |  |
| 12 | There is the use of new approaches in the management of debts. |  |  |  |  |  |
| 13 | The SACCOs have developed new investment strategies. |  |  |  |  |  |
| 14 | There is the use of new approaches in risk management. |  |  |  |  |  |
| 15 | The SACCO has adopted enhanced insurance cover against loan defaults. |  |  |  |  |  |