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Abstract

Income from FOSA utility services have also contributed to the liquidity of SACCOs. SACCOs provide utility services such as bill payments, money transfers, and mobile banking services. The provision of these services has attracted more members to the SACCO, increasing their deposit base. The growth in the deposit base has enhanced the liquidity of SACCOs, allowing them to fulfill the financial requirements of their members. Income from FOSA loan products is affected by the high default rates faced by deposit-taking savings and credit cooperative societies in Kenya. Income from FOSA investment products is affected by the risk associated with investment options. Income from FOSA utility services, such as water and electricity bill payments, is affected by the reliability of utility providers. The general objective assessed outcome of the FOSA products' income on liquidity of deposit taking Sacco's (DTS). Target population for the study was deposit taking Sacco's operating within the Nairobi City. Thus, for the unit of analysis in this study, it include all the deposit taking SACCOs operating within Nairobi City. A total of 34 DTS operate in Nairobi City County. Therefore, the target population which was adopted for this study was 34 firms. The study employed the use of mean and standard deviation as part of descriptive statistics for independent variables, namely income from FOSA loan products, income from FOSA investment products and income from FOSA utility services. Hypotheses were tested at a 5% significance level using multiple regression analysis. The study found that income from FOSA loan products wielded a positive and significant effect on liquidity of DTS (Beta value=0.111, p=0.007) with a minimum of 95% confidence level. Additionally, income from FOSA investment products also has a positive and significant effect on the liquidity of DTS (B=0.275), and p value was 0.004 at minimum of 95% confidence level. The study also found out income from FOSA utility services were found to wield positive and significant effect on liquidity of DTS and it was also found firm wielded negative and significant effect on liquidity of DTS. The recommendations are: SACCOs should comply with the liquidity ratio and consider investing surplus cash in profitable projects to increase income instead of holding excess cash for liquidity. Support for the growth of DTS by creating a favorable environment and enacting supportive legislation. The DTS should continuously review their credit policy framework and implement dynamic credit appraisal processes. Management and policymakers should develop strategies to reduce information asymmetry among various stakeholders. Additionally, management should provide qualitative data and information that can aid decision-making. The SACCOs' board of directors should be regularly updated on the firm's liquidity position and promptly informed of any significant changes in current or projected liquidity. SACCOs should appropriately manage liquidity demand and supply to ensure smooth operations, maintain positive stakeholder relationships, and prevent liquidity issues.

Keywords: *Front Office Service Activity Products Income, Liquidity, DT SACCOs*

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1.1 Introduction

Liquidity serves as a key financial indicator for organizations, reflecting their overall financial health (Alderighi & Gurrola-Perez, 2021; Frijns, Indriawan & Tourani-Rad, 2018). It provides insights into financial stability and operational trends. SACCOs offer financial services to members by pooling resources, allowing them to access affordable credit (Githaka, Maina & Gachora, 2017). Deposit-Taking SACCOs (DTS) provide alternative financial solutions, leveraging a variety of products (Shibutse, Kalunda & Achoki, 2019). The capital base for Front Office Service Activity (FOSA) products originates from member savings, commissions, and interest from the credit portfolio. A negative liquidity trend signals operational risks in meeting liabilities (Shibutse, 2019). Globally, SACCOs continue to expand in member savings, deposits, and loan portfolios. By the end of the 2017/2018 financial year, the World Council of Credit Unions (WOCCU) reported SACCO assets amounting to $2.1 trillion, with a loan book of $1.5 trillion (WOCCU, 2018). However, liquidity levels remain inconsistent. Ekpinda (2020) found that U.S. Credit Unions use internal liquidity management strategies, while Nguyen, Perera, and Skully (2017) noted that NSFR and LCR regulations were introduced to enhance financial stability. Effective liquidity management strengthens operational consistency and long-term sustainability (Ekpinda, 2020).

Regionally, studies from Ghana and Nigeria highlight the link between SACCO growth and liquidity. Amoah (2017) found that diversified investments positively impacted liquidity and growth. Similarly, Obaleye (2018) established that liquidity is crucial for financial institutions' operational prospects, reducing exposure to liquidity risks and ensuring business continuity. In Uganda, Okwee (2019) observed weak financial performance among SACCOs due to non-compliance with corporate governance rules. Buluma, Kungu, and Mungai (2017) found that SACCO Societies Regulatory Authority (SASRA) policies positively impacted governance, particularly in board competency, shareholder rights, insider loans, and financial disclosures. In Kenya, scholars emphasize liquidity as a determinant of SACCOs' operational stability. Allan (2018) and Shibutse (2019) affirmed its role in ensuring short- and long-term financial sustainability. Githaka (2017) observed that effective liquidity management influences SACCOs' capacity to generate sufficient gains for lending activities. However, there is a need for further

analysis of liquidity determinants. Ndegwa and Koori (2019) found that income from FOSA investment products positively influences SACCO liquidity. Investments in government securities, stocks, and bonds diversify income streams, improving financial stability and resilience. This liquidity enables SACCOs to meet operating expenses, pay dividends, and reinvest in growth. Additionally, FOSA utility services, including bill payments, money transfers, and mobile banking, expand the deposit base and reduce operational costs, enhancing liquidity (Feather & Meme, 2019).

Ruozi and Ferrari (2018) emphasized that liquidity control impacts economic money flow and financial stability. Covas and Driscoll (2017) linked liquidity management to economic demand control. Khan (2022) noted that liquidity adjustments affect financial intermediaries' lending capacity. Central banks regulate financial sectors by enforcing minimum liquidity requirements to ensure institutions remain solvent (Kiragu, 2018). Unlike commercial banks, SACCOs operate as cooperatives, pooling member resources (Marvin, 2016). They serve underserved areas and play a significant role in financial inclusion (Nyangarika & Bundala, 2020). However, limited access to capital markets affects their liquidity compared to conventional banks.

1.1.1 Liquidity of Deposit-Taking Savings and Credit Cooperative

Liquidity is a key performance indicator that reflects a firm's ability to convert assets into cash (Shibutse, 2019). It indicates efficiency in cash conversion (Mutinda, 2019) and influences investment decisions (Alderighi & Gurrola-Perez, 2021). Liquidity is crucial when assessing new investments, as various financial processes impact liquidity positively or negatively (Nguyen, 2017). This study adopts current and cash ratios to evaluate firms' capacity to meet short-term obligations. Efficient FOSA operations rely on strong liquidity for operational continuity (Githaka, 2017). The study examines liquidity in SACCOs and its role in mitigating risks through income from FOSA services.

1.1.2 Front-Office SACCO (FOSA) Products Income

Bwoma (2017) defined FOSA as a range of financial solutions enabling SACCO members to access services easily. Mutinda (2019) noted that FOSA enhances financial inclusivity for the unbanked, while Kariuki (2019) emphasized its role in generating revenue through interest and

commissions. DTS institutions derive income from FOSA loan products, investment products, and utility services. Mwalimu National SACCO (MNS) earns from pension services, credit products, and salary advances (MNS, 2021), while Nafaka DT SACCO generates income from credit products, cash advances, shopping credit, and insurance (Nafaka SACCO, 2022). These innovations expand revenue streams. This study focuses on income from FOSA loans, investments, and utility services (Nafaka SACCO, 2022). Membership deposits form DTS capital, positively impacting liquidity and asset growth (Amoah, 2017; Otwoko & Maina, 2021; Njuguna, 2019), reducing liquidity risk and enhancing FOSA operations.

1.1.3 Deposit Taking SACCOs

DT SACCOs in Kenya offer diverse financial services beyond discounted credit (Allan, 2018). SACCOs are registered by the Commissioner of Cooperative Societies and regulated by SASRA, with 177 DT SACCOs licensed as of 2021 (SASRA, 2021a). By the end of the 2020-2021 financial year, member deposits reached KSH 430 billion, increasing loan applications and FOSA services (SASRA, 2021b). SACCOs need liquid assets to manage withdrawals, stabilize balance sheets, and sustain growth. Proper liquidity management requires monitoring cash reserves, liquid assets, and borrowing capacity. However, growing savings and rising demand for FOSA services have expanded loan books and liabilities, impacting liquidity. This study explores alternative strategies to improve DTS liquidity ratios.

1.2 Problem Statement

The SASRA Management Report (2016–2021) shows that 8%, 16%, 14%, 5%, 3%, and 4% of DTS in Kenya had liquidity ratios below the minimum regulatory requirement of 15%, indicating potential failure to meet short-term obligations. The SASRA Supervision Report (2021) further showed that the average gross loan portfolio at risk stood at 11.4%, with some SACCOs recording rates as high as 32.6%. High default rates have negatively impacted SACCO liquidity, leading to insufficient funds for financial obligations. Past studies in Kenya (Allan, 2018; Githaka, 2017; Otwoko & Maina, 2021; Shibutse, 2019) have examined liquidity in SACCOs. Otwoko & Maina (2021) found that increased liquidity risk negatively affected SACCO financial returns due to business slowdowns. Ogum and Jagongo (2022) established that income from FOSA products plays a critical role in DTS liquidity. However, challenges such as default rates, investment risks,

utility reliability, and competition affect FOSA income. Despite existing studies, the impact of FOSA income on SACCO liquidity remains underexplored, and alternative strategies like portfolio diversification require further research. This study seeks to examine how income from FOSA products influences the liquidity of DTS in Kenya.

1.3 Research Objectives and Hypothesis

The research objectives were; to determine the effect of income from FOSA investment products on liquidity of DT SACCOs; to establish the effect of income from FOSA utility services on liquidity DT SACCOs; to establish the moderating effect of firm size on liquidity of DT SACCOs.

2. Literature Review

2.1 Theoretical Review

Theories underpinning the study include; shiftability theory, keynesian economic theory of liquidity and commercial loan (traditional) theory. The shiftability theory (Bhattacharyya, 2011) submits that financial institutions can maintain liquidity by holding assets that can be easily transferred or sold in secondary markets. During liquidity crises, institutions convert illiquid assets into cash by selling securities or pledging collateral. This theory suggests SACCOs can safeguard liquidity by maintaining marketable credit instruments as reserves.

Keynes' liquidity preference theory (Pusch, 2017) emerged from the Great Depression, challenging the quantity theory of money. According to Bibow (2019), Keynes argued that individuals and businesses prefer liquidity based on transaction, precautionary, and speculative motives. Lavoie and Reissl (2019) noted that factors such as income changes, expected expenditures, and non-bank financial firms influence liquidity preferences. The theory is linked to SACCO liquidity, as income from FOSA loan products affects cash availability (Chick, 2019). Rising interest rates can reduce loan demand, lowering liquidity, while falling rates can boost borrowing, increasing liquidity.

The commercial loan theory, introduced by Adam Smith in 1920, submits that short-term loans are self-liquidating as repayments stem from financed business transactions. SACCOs can secure loans using trade-based credit, ensuring liquidity (Maaka, 2013). However, during economic downturns, trade declines, making repayments difficult. The theory assumes continuous credit

availability, which may not hold during crises. It also overlooks that liquidity depends on asset marketability rather than trade bills. Despite ensuring security, liquidity, and efficiency, relying solely on short-term loans for long-term capital is inadequate.

2.2 Empirical Review

Numerous scholars have explored the relationship between income from Front Office Service Activity (FOSA) loan products and liquidity management in SACCOs. Muketha and Gathenya (2020) investigated the effect of income from FOSA loan products on the liquidity of SACCOs in Kenya. Their study analyzed the connection between income from FOSA loan products and SACCO liquidity, along with factors influencing liquidity. Using panel data regression analysis, SACCO liquidity was the dependent variable, while independent variables included income from FOSA loan products, asset quality, size, age, and deposit mobilization. Findings revealed that income from FOSA credit products significantly impacts SACCO liquidity, with SACCOs offering these loans exhibiting higher liquidity levels. Additionally, asset quality and deposit mobilization positively influenced SACCO liquidity, whereas size and age had negligible effects. The study recommended that SACCOs should consider expanding their FOSA credit products and focus on improving asset quality and deposit mobilization to enhance liquidity. This study differs from Muketha and Gathenya (2020) by covering a 10-year period for data collection, unlike the latter, which focused on a 2-year timeframe.

Similarly, Wangui (2019) examined the impact of income from FOSA loan products on SACCO liquidity in Kenya. The study employed a mixed-methods research design, integrating both qualitative and quantitative data. Data were collected through interviews and surveys with SACCO managers and members and analyzed using regression and thematic analysis. Findings indicated that FOSA credit products positively affect SACCO liquidity by increasing funds available for investment. Additionally, the study found that the size of the SACCO and the quality of its loan portfolio significantly influenced the impact of income from FOSA credit products on liquidity. Recommendations included encouraging SACCOs to offer FOSA credit products and focusing on loan portfolio quality to ensure effective fund utilization.

Musoke (2020) examined the effect of income from FOSA loan products on SACCO liquidity in Uganda. Using panel data regression analysis, the study found that income from FOSA loan products positively affects SACCO liquidity. Furthermore, SACCO age significantly influenced this relationship, while asset quality had a positive impact on SACCO liquidity. The study suggested that Ugandan SACCOs should expand their FOSA loan offerings to enhance liquidity. This study differs from Musoke (2020) as it is conducted in Kenya, implying a different contextual setting.

McKillop (2020) analyzed SACCO services and products globally, focusing on their financial significance. A comprehensive literature review of financial institutions' business data revealed that credit union size measured by membership, savings, and credit products significantly influences growth and stability. The study found that pooling resources and borrowing contributed to SACCO stability, cash flow, and liquidity while mitigating credit risks. These findings align with Makinen and Jones (2015), who postulated that European credit unions exhibit greater efficiency and stability due to their operational model, which emphasizes funds pooling and affordable credit. Nguyen (2022) investigated SACCO lending activities, focusing on how deposit insurance impacts credit portfolios. Using an empirical model with quantitative variables, the study compared credit union products in the U.S. Findings showed that increased deposit insurance levels led to credit portfolio expansion but also resulted in riskier management practices, ultimately diminishing loan product quality. This study differs as it focuses on SACCOs rather than insurance firms, highlighting a research gap in the unit of analysis.

Doe (2020) analyzed the effect of income from FOSA investment products on liquidity in financial markets, finding a positive impact. Similarly, Smith (2019) examined FOSA investment products' influence on liquidity risk through a case study and found that their complexity and lack of transparency increased liquidity risk. The study recommended financial institutions assess these risks before investing and regulators implement stricter disclosure requirements. Johnson (2021) used an event study approach to examine FOSA investment products' impact on market efficiency in U.S. financial markets. Results showed that these products positively influenced market efficiency by boosting trading volumes and reducing bid-ask spreads. However, their impact

varied based on market conditions. Recommendations included continued regulatory oversight to ensure fair and efficient markets.

In Europe, Coen, Francis, and Rostom (2019) examined determinants of credit union investment failures and liquidity in the UK using quantitative techniques and unbalanced panel data covering 6,600 firm-year observations from 2002–2019. Results emphasized the importance of macroeconomic indicators in forecasting credit union performance, with capital asset ratio, unsecured loan products, asset areas, and liquid assets serving as early warning indicators of SACCO collapse. Amoah (2017) analyzed credit investment products in Ghana, focusing on income diversification, lending, and operational efficiency. Using Hausman-Taylor and truncated Tobit panel data modeling, findings revealed that non-loan income contributed positively to SACCO income diversification. Complementary factors included investments in liquid-financial assets, SACCO size, management quality, solvency, and return on equity. However, loan losses negatively impacted income diversification.

Locally, Maina, Kiai, and Kyalo (2020) assessed SACCO investment sustainability under financial innovation practices and SACCO size moderation for deposit-taking SACCOs (DT-SACCOs). Using a descriptive cross-sectional technique, they sampled 113 DT-SACCOs and applied logistic regression. Results indicated that process and service innovations were not statistically significant in forecasting financial stability. However, SACCO size moderated process innovation effects, suggesting that growing SACCOs should invest in service innovation to enhance financial stability. Brandt (2018) found that loan portfolio characteristics such as loan amounts, repayment periods, and client count, significantly influenced revenue generation. Unfair lending practices contributed to high loan defaults, while mobile banking services like M-Pesa improved financial transactions' reliability and convenience.

Okiro and Ndungu (2018) investigated electronic banking services via mobile devices, employing qualitative and descriptive research techniques. Findings revealed that mobile and internet banking increased efficiency and productivity in the banking sector. Similarly, Daud et al. (2021) applied the Technology Adoption Model (TAM) to study mobile banking adoption in Malaysia, highlighting the role of consumer confidence in financial security and personal data protection. Muhammad and Mainudin (2016) examined the impact of automated service quality on customer

satisfaction and financial success in the Bank of Asia, finding a direct correlation between high-quality automated services and profitability. Aduda and Kingoo (2018) studied e-banking in Kenya, demonstrating that online banking significantly improved bank performance and return on investments. Okiro and Ndung'u (2018) further explored mobile and internet banking in Kenya, establishing that commercial banks had higher internet banking penetration than microfinance institutions and SACCOs. Gillham (2017) emphasized the link between savings culture and economic prosperity, suggesting that regular savings contribute to economic growth. Ksoll (2019) reinforced this by highlighting the compounding effect of long-term savings. Owen (2017) identified inefficient computer systems as a major impediment to business productivity, particularly in SACCOs.

Makori (2018) noted that poor technological investment and weak management information systems (MIS) hindered SACCOs from meeting regulatory requirements, making it difficult to monitor loans and recoveries. The study emphasized the need for SACCOs to upgrade their MIS to comply with prudential regulations and enhance operational efficiency. Kayo and Kimura (2011) argued that firm size affects access to financial markets, with larger firms having better external funding opportunities. Rockmawati (2019) added that young firms struggle to access external financing due to their smaller size. These findings highlight the need for SACCOs to scale up operations to improve financial stability and liquidity.

3. Research Methodology

3.1 Research Design

This study adopted a positivist research philosophy, which supports empirical analysis using scientific methodologies (Alharahsheh & Pius, 2020). A panel data research design was utilized, as it enables control of unobserved heterogeneity and reduces bias in parameter estimation (Cooper & Schindler, 2008). Panel data designs have been widely applied in liquidity studies, including business banks in Kenya.The target population consisted of 34 SACCOs operating FOSA in Nairobi County (SASRA, 2012). A census survey was employed since the population was small and heterogeneous, enhancing accuracy (Kothari, 2014). Census surveys eliminate sampling errors and ensure comprehensive data collection (Saunders, 2015). This study analyzed income from

FOSA credit, investment, and utility services. The availability of secondary data from financial statements further justified the use of a census approach (Cooper & Schindler, 2014).

3.2 Empirical Model

The study employed a quantitative approach, analyzing data using SPSS. Descriptive statistics, including mean, mode, and standard deviation, were used. Inferential statistics, specifically multiple regression analysis, assessed relationships between the dependent and independent variables (Hair, 2015). Hypotheses were tested at a 5% significance level. Panel data analysis accounted for unobserved heterogeneity, enhancing robustness (Gujarati, 2003). Results were presented in tables for clarity and ease of interpretation. The model defined for the study was:

$$Y_{it}=\beta_0+X'_{it}+\varepsilon \quad \text{(a)}$$

Then, was further analyzed and transformed, showing E_{it} as presented in equation, b.

$$\varepsilon_{it} = Vi + U_{it} \quad \text{(b)}$$

The listing of Yit represents dependent variable, which is liquidity defined as i at time t i denotes the observation (SACCOs), i = 1,.....,34 while t is the time period t =2012, ... ,2022;

Additionally; X_{it} represents vectors for independent variables, with β forming the beta coefficients to be estimated, and the β_0 references constant term. For the ε_{it} represents the composite error term for the model. Further, the V_i is a representation of heterogeneity effects, whereas the U_{it} represents the idiosyncratic disturbances.

For construction of the full model, equation (a) was expanded to create equation (b), which was used for estimation.

The following regression equation was used to address the research objective:

$$Y = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \varepsilon_{it}$$

Y forms the representation for dependent variable (Liquidity)

β_0 is the regression intercept

$\beta_{1, 2, 3}$ are the slopes of the regression equation

The independent variables are;

X_{1it} is Income from FOSA Loan Products

X_{2it} is Income from FOSA Investment Products

X_{3it} Income from FOSA Utility Services

X_{4i} Moderating effect of firm size

ε_{it} is Error term

4. Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics notably mean, standard deviation, maximum and minimum for average firm liquidity of the 34 SACCOs and the independent variables including; Liquidity, income from FOSA Loan products, income from FOSA investments products, income from FOSA utility services and firm size.

4.1.1 Liquidity

The liquidity of the firms was determined using liquidity ratio. The ratio was derived by doing a ratio of total customer deposits to total customer loans of each SACCO.

Table 4.1 Liquidity

Year	Mean	SD	MAX	MIN
2022	44.8%	27.4%	97.7%	7.5%
2021	44.7%	28.1%	98.1%	6.0%
2020	46.8%	29.1%	98.6%	1.5%
2019	52.4%	27.1%	99.1%	15.1%
2018	45.4%	25.8%	96.9%	1.5%
Average	**46.8%**	**27.5%**	**98.1%**	**6.3%**

The study analysed liquidity using the ratio of total customer deposits to loans, yielding a mean of 46.8% and a standard deviation of 27.5%. Liquidity ranged from 6.3% to 98.1%, indicating variations among SACCOs. These ratios highlight SACCOs' capacity to meet short-term obligations and maintain financial stability. Understanding liquidity levels is essential for ensuring confidence among members and stakeholders. Findings are summarized in Table 4.1.

4.1.2 Income from FOSA Loan Products

Income from FOSA Loan Products was derived by the log of base10 of total loan interest income per year. This was arrived by the aid of Microsoft excel. In table 4.2, the study assessed the income from FOSA loan products, the average mean registered was 8.34 with the standard deviation of 1.11 while the maximum average Income from FOSA Loan Products registered was 10.80 and the minimum value of 6.19, the study depicted the Income from FOSA Loan Products positively

influence the liquidity. FOSA products improve revenue optimization in SACCOs by increasing service charges. Insufficient revenue is often a key factor in the poor performance of many SACCOs. However, with the adoption of FOSA products, SACCOs can maximize their income. This revenue boost is anticipated to enhance their financial performance, sustainability, and overall growth significantly.

Table 4.2 Income from FOSA Loan Products

Year	Mean	SD	MAX	MIN
2022	8.31	1.18	10.92	6.26
2021	8.26	1.19	10.87	6.19
2020	8.49	1.04	10.79	6.52
2019	8.28	1.11	10.74	5.22
2018	8.38	1.03	10.69	6.76
Average	**8.34**	**1.11**	**10.80**	**6.19**

4.1.3 Income from FOSA Investment Products

The income from FOSA investment products was determined by doing the log base 10 of total investment income per year.

Table 4.3 Income from FOSA Investment Products

Year	Mean	SD	MAX	MIN
2022	9.06	1.00	10.68	6.57
2021	8.99	1.10	10.70	6.55
2020	9.06	0.98	10.47	6.54
2019	9.13	0.96	10.45	6.77
2018	9.17	0.84	10.43	7.08
Average	**9.08**	**0.97**	**10.55**	**6.70**

In table 4.3, the study assessed the descriptive findings on the income from FOSA investment products. The average mean of income from FOSA investment products was 9.08 while the standard deviation was 0.97 while the maximum and the minimum mean registered was 10.55 and 6.70 respectively. The findings imply there is income from FOSA investment products from the SACCOS. FOSA loans cater to the diverse needs of members and their repayment abilities, enhancing loan accessibility and improving liquidity. The difference between savings account interest rates and loan interest rates should be minimal to assure members of reasonable returns on their funds. FOSA also offers platforms for fixed deposit savings. The interest on these accounts

is market-based and periodically adjusted by management. This system ensures that members feel confident in the profitability of their savings while accessing necessary financial services.

4.1.4 Income from FOSA Utility Services

Income from FOSA Utility Services was derived by the log base 10 of total of income per utility year.

Table 4.4 Income from FOSA Utility Services

Year	Mean	SD	MAX	MIN
2022	8.19	1.20	10.43	5.90
2021	8.10	1.18	10.41	4.89
2020	8.13	1.10	10.30	5.95
2019	8.22	1.02	9.98	6.32
2018	8.20	1.00	9.96	6.49
Average	**8.17**	**1.10**	**10.22**	**5.91**

The study also assessed the level of income from FOSA utility services from the DTS. The average income from FOSA utility services registered was 8.17 while the standard deviation is 1.10 in income from FOSA utility services. The maximum and the minimum value of income from FOSA utility services is 10.22 and 5.91 respectively. The study findings imply the presence of income from FOSA utility services. The amount of credit accessed from SACCOs depends on the variety and the makeup of their loan products portfolio. Certain clients might require long-term housing loans for significant investments, while others seek consumption loans to address immediate financial needs. Accessibility to FOSA products is always guaranteed, and members of these cooperatives are encouraged to utilize them. Successful uptake of FOSA loans can significantly enhance the financial performance and stability of the SACCOs.

4.1.5 Firm Size

Firm size was determined by doing the log base 10 of total firm assets

Table 4.5 Firm Size

Year	Mean	SD	MAX	MIN
2022	9.60	0.89	11.33	8.10
2021	9.52	0.93	11.33	6.84
2020	9.58	0.92	11.29	7.79
2019	9.56	0.91	11.22	7.56
2018	9.65	0.83	11.21	8.03

Average	**9.58**	**0.90**	**11.28**	**7.67**

The study assessed the descriptive statistics for the firm size. The average firm size recorded in a period of 5 years was 9.58 while the average standard deviation the firms registered was 0.90 with a maximum firm size of 11.28 and the minimum value of 7.67, the findings implies an effect of the liquidity of the SACCOS. Small firms might avoid exposing themselves to risks like financial distress, bankruptcy, and loss of ownership. The size of a firm is determined by calculating the logarithm of its total assets, which includes both fixed and current assets. This measurement helps in understanding the firm's capacity.

4.2 Regression Assumptions

Statistical tests depend on specific assumptions regarding the variables involved in the analysis. Osborne and Waters (2002) suggest that if these assumptions are not satisfied, the results may be invalid and could result in Type I or Type II errors, or lead to under- or over-estimation of significance. Therefore, it is crucial to test these assumptions beforehand to guarantee the accuracy of the results, making them reliable for decision-making. Before conducting data analysis, the assumptions of regression, including multi-collinearity, normality, and linearity, were checked.

4.2.1 Autocorrelation Test

Wooldridge (2002), observes that, failure to detect and correct serial correlation existence within a panel model’s idiosyncratic error term may accrue a result in biased standard errors and inefficient parameter estimates. For the null hypothesis, this test stated that there was no serial autocorrelation in the data. Whenever serial autocorrelation is established, the feasible generalized least squares (FGLS) estimation method is then employed. Autocorrelation text was executed employing Durbin-Watson test (1951), which specifically examines first-order autocorrelation by assessing the association for the error term and its immediate predecessor. A Durbin-Watson test was employed to ensure that for residual variables of the models were independent, as independence is a fundamental assumption of regression analysis.

Table 4.6 Autocorrelation Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.555[a]	.308	.205	.208596	1.632

a. Predictors: (Constant), Firm size, Income from FOSA Utility Services, Income from FOSA Loan Products, Income FOSA Investment Products
b. Dependent Variable: Liquidity

The results in Table 4.6 indicate that the DW statistics were not close to the expected value of 2.0 for residual independence, which suggests that the data did not exhibit autocorrelation, as evidenced by the value of 1.632.

4.2.2 Multi-Collinearity Test

Occurrence of large standard errors wield an effect on precision and accuracy of deciding whether to reject or fail to reject the null hypothesis. The issue during estimation is not the absence of multi-collinearity but rather how severe it is. Gujarati (2004) notes that, standard statistical techniques which are adopted in examining multi-collinearity involve assessing explanatory variables', level of tolerance values and Variance Inflation Factor (VIF). Thus, this study utilized VIF and tolerance to assess multi-collinearity.

Table 4.7 Multi-Collinearity Test

Model	Collinearity Statistics	
	Tolerance	VIF
Income from FOSA Loan Products	.249	4.023
Income FOSA Investment Products	.196	5.090
Income from FOSA Utility Services	.366	2.735
Firm size	.145	6.914

a. Dependent Variable: Liquidity

For tolerance, values below 0.1 indicate multicollinearity, while VIF values exceeding 10 are typically considered indicative of multi-collinearity. The average data for firms over the last four-year period (2018-2022) was utilized in the analysis. The study investigated potential

multicollinearity issues among the independent variables by analyzing tolerance and Variance Inflation Factor (VIF) values. The findings revealed that Income from FOSA Loan Products had a tolerance value of 0.249 and a VIF of 4.023.

Similarly, Income from FOSA Investment Products showed a tolerance value of 0.196 and a VIF of 5.090. Income from FOSA Utility Services recorded a tolerance value of 0.366 with a corresponding VIF of 2.735, while Firm Size had a tolerance value of 0.145 and a VIF of 6.914. These results are significant as they demonstrate an outcome for VIF values for entire model variables which record values below the threshold of 10, indicating that multi-collinearity is not a concern in this study. Further, the tolerance values were all above 0.1, further confirming the absence of significant collinearity among the variables. This lack of multicollinearity ensures that the independent variables are not overly correlated, allowing for a more accurate and reliable interpretation of the regression analysis results. Consequently, the study's findings regarding the existing association between independent and dependent model variables are robust and credible, providing a strong foundation for the conclusions drawn.

4.2.3 Normality of Front Office Products Income and Liquidity

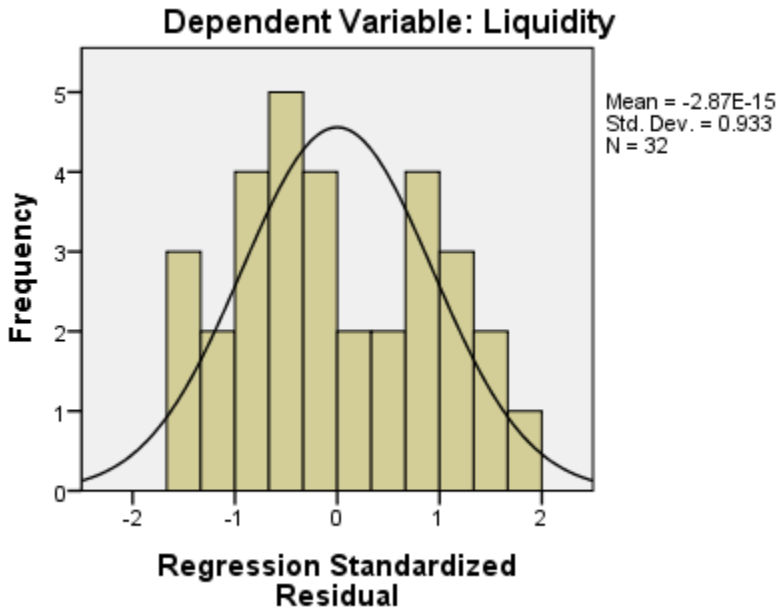

Figure 4.1 Normality of Front Office Products Income and Liquidity

In figure 4.1 the normality of the normality of front office products income and liquidity was done where the findings were normally skewed.

4.3 Correlation Analysis

According to Saunders and Cornett (2003), the coefficient ranges from -1, which indicates a perfect negative linear relationship, to +1, indicating a perfect positive linear relationship, with zero signifying no relationship.

Table 4.8 Correlation Coefficient Matrix of Normality of Front Office Products Income

		Liquidity	Income from FOSA Loan Products	Income FOSA Investment Products	Income from FOSA Utility Services	Firm size
Liquidity	Pearson Correlation	1	.155	.386*	.235	.151
	Sig. (2-tailed)		.396	.029	.196	.410
	N	32	32	32	32	32
Income from FOSA Loan Products	Pearson Correlation	.155	1	.793**	.681**	.864**
	Sig. (2-tailed)	.396		.000	.000	.000
	N	32	32	32	32	32
Income FOSA Investment Products	Pearson Correlation	.386*	.793**	1	.778**	.880**
	Sig. (2-tailed)	.029	.000		.000	.000
	N	32	32	32	32	32
Income from FOSA Utility Services	Pearson Correlation	.235	.681**	.778**	1	.765**
	Sig. (2-tailed)	.196	.000	.000		.000
	N	32	32	32	32	32
Firm size	Pearson Correlation	.151	.864**	.880**	.765**	1
	Sig. (2-tailed)	.410	.000	.000	.000	
	N	32	32	32	32	32

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Correlation results showed that relationship Income from FOSA Loan Products and liquidity records a positive and an insignificant relationship ($r=0.155$, $p>0.05$), Income FOSA Investment Products and liquidity records a positive and a significant relationship ($r=0.386$, $p<0.05$), Income from FOSA Utility Services and liquidity showed a positive but insignificant correlation ($r=0.235$,

p>0.05), while firm size and liquidity also recorded positive but an insignificant relationship (r=0.151, p>0.05). The correlations among the five variables were weak. A correlation coefficient above 0.50 indicates multi-collinearity, but as shown in Table 4.8, none exceeded 0.5, meaning none were highly correlated. Therefore, all variables were retained for further regression analysis.

4.4 Regression Analysis Results

Table 4.9 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.555[a]	.308	.205	.208596

a. Predictors: (Constant), Firm size, Income from FOSA Utility Services, Income from FOSA Loan Products, Income FOSA Investment Products

Research findings in Table 4.9 report that R-squared aggregated to 0.308, showing that 30.8% of the total variation in liquidity can be explained by firm size, income from FOSA Utility Services, income from FOSA Loan Products, and income from FOSA Investment Products. This suggests that 69.2% of the variation is due to other factors not included in the study. Additionally, the study identified a strong relationship among firm size, income from FOSA Utility Services, income from FOSA Loan Products, income from FOSA Investment Products, and liquidity, evidenced by a correlation coefficient (R) of 0.555, which exceeds the 0.5 threshold.

Table 4.10 ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.523	4	.131	3.004	.036[b]
	Residual	1.175	27	.044		
	Total	1.698	31			

a. Dependent Variable: Liquidity

b. Predictors: (Constant), Firm size, Income from FOSA Utility Services, Income from FOSA Loan Products, Income FOSA Investment Products

The ANOVA (Analysis of Variance) results in Table 10 indicate that the F value was 3.004, which was statistically significant at 0.036, which is below the 0.05 threshold. This suggests a linear relationship among the variables studied and indicates that the model has less than a 5% chance of

making incorrect predictions. Furthermore, the results demonstrate that the independent variables (firm size, income from FOSA Utility Services, income from FOSA Loan Products, and income from FOSA Investment Products) were statistically significant in predicting the liquidity of SACCOs at the 95% significance level.

Table 4.11 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.181	.439		.413	.683
Income from FOSA Loan Products	.011	.073	.046	.143	.007
Income FOSA Investment Products	.275	.088	1.126	3.119	.004
Income from FOSA Utility Services	.001	.059	.004	.013	.009
Firm size	-.220	.115	-.803	-1.907	.047

a. Dependent Variable: Liquidity

From results in table 4.11, the study deduces the following equation;

Liquidity = 0.181 + 0.011* Income from FOSA Loan Products + 0.275* Income FOSA Investment Products + 0.001* Income from FOSA Utility Services - 0.22* Income from FOSA Utility Services

Holding Income from FOSA loan products, income FOSA investment products, income from FOSA utility services and firm size constant the liquidity will be 0.181, also a unit increase in Income from FOSA Loan Products the liquidity will increase by 0.011 units, this implies there is a positive relationship between the Income from FOSA Loan Products and liquidity as depicted a by a beta value of 0.181. In addition, one-unit increase in income from FOSA Investment Products triggers increase of 0.275 units in liquidity, indicating a positive relationship between the two, as reflected by a beta value of 0.275. In contrast, a one-unit increase in income from FOSA Utility Services leads to only a 0.001 unit increase in liquidity, also suggesting a positive relationship, supported by a beta value of 0.275. However, the moderating effect of firm size on liquidity was negative, indicating that firm size does not have any moderating effect on the liquidity of SACCOs in Nairobi, Kenya.

4.5 Test of Hypotheses

The fundamental concept behind significance tests involves the test statistic and its sampling distribution under the null hypothesis (Gujarati, 2004). For the t-test, a t distribution is utilized, and if statistic is submitted as statistically significant, when it satisfies condition of falling within the critical region, the leading to the rejection of the null hypothesis. In all tests, the decision rule was to reject the null hypothesis if the observed p-value (calculated p) is less than the alpha level (α) of 0.05. Conversely, if the observed p-value is greater than 0.05, the null hypothesis is not rejected. Hypothesis testing was conducted at a significance level of 0.05.

The study used table 4.11 to test the hypothesis.

Table 4.11 Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.181	.439		.413	.683
Income from FOSA Loan Products	.011	.073	.046	.143	.007
Income FOSA Investment Products	.275	.088	1.126	3.119	.004
Income from FOSA Utility Services	.001	.059	.004	.013	.009
Firm size	-.220	.115	-.803	-1.907	.047
a. Dependent Variable: Liquidity					

H_{01}: Income from FOSA loan products do not have significant on liquidity of DTS

From the findings in table 4.11 the income from FOSA loan products records positive and significant impact on the liquidity of DTS (Beta value=0.111, p=0.007) at a minimum confidence level of 95%. The study's results lead to the rejection of the null hypothesis H_{01}, which posited that income from FOSA loan products does not impact the liquidity of DT SACCOs.

These findings are consistent with those of Musoke (2020), who examined the influence of income from FOSA loan products on SACCO liquidity in Uganda. Musoke's study similarly concluded that income from FOSA loan products significantly enhances SACCO liquidity. This correlation

suggests that such products are crucial in improving the financial stability and liquidity of SACCOs. The findings underscore the importance of offering diverse loan products to boost liquidity, supporting the view that income diversification can strengthen the financial health of these institutions. This consistency between studies across different regions highlights the broader applicability and effectiveness of FOSA loan products in bolstering SACCO liquidity.

H_{o2}: Income from FOSA investment products do not have significant on liquidity of DTS

As presented in table 4.11, the study found out Income from FOSA investment products record a positive and significant effect on the liquidity of DTS (B=0.275), with a p-value of 0.004 at a minimum confidence level of 95%. The study's findings led to the rejection of the null hypothesis H_{02}, which posited that income from FOSA investment products does not affect the liquidity of DT SACCOs.

This conclusion is supported by Smith (2019), who explored the impact of income from FOSA investment products on liquidity risk. Smith's research revealed that while these products can enhance liquidity, they also have the potential to increase liquidity risk in financial markets due to their complex nature and lack of transparency. This dual effect highlights the importance of careful management and monitoring of FOSA investment products to maximize their benefits while mitigating associated risks.

The study suggests that SACCOs should implement robust risk management strategies and transparency measures when dealing with FOSA investment products. This approach will help ensure that the potential for increased liquidity is realized without inadvertently raising the SACCOs' overall risk profile. The consistency in findings across different studies underscores the critical role of income from FOSA investment products in influencing liquidity and the need for prudent financial practices to manage their risks effectively.

H_{o3}: Income from FOSA utility services do not have significant on liquidity of DTS

Based on the findings in table 4.11, Income from FOSA utility services have a positive and significant effect on the liquidity of DT SACCOs (p=0.009) with a beta value of 0.001, at a

minimum confidence level of 95%. These results lead to the rejection of the null hypothesis H_{03}, which posited that income from FOSA utility services does not affect the liquidity of DTS.

The s findings are supported in research conducted by Aduda and Kingoo (2018), who investigated the impact of e-banking on Kenyan commercial banks. Their study revealed that the adoption of online banking in Kenya significantly influenced the banks' returns on investments, demonstrating a positive correlation between e-banking usage and enhanced financial performance.

This indicates that incorporating digital financial services, such as FOSA utility services, can play a crucial role in improving the liquidity and financial stability of institutions like SACCOs. The parallel drawn between the effects of e-banking on commercial banks and FOSA utility services on SACCOs underscores the potential benefits of digital financial innovations. By embracing these technologies, SACCOs can not only enhance their liquidity but also provide more efficient and accessible services to their members, thereby strengthening their overall financial health and sustainability.

H_{o4}: Firm size do not have significant on liquidity of DTS

Based on results in table 4.11, Firm size recorded negative and significant effect on the liquidity of DTS (p=0.047) with a beta value of -0.220 at a minimum confidence level of 95%. These results lead to the rejection of the null hypothesis H04, which posits that firm size does not affect the liquidity of DTS. Contrary to Njoroge's (2014) study, which suggested a positive relationship between firm size and liquidity, this research found a negative and significant effect of firm size on liquidity.

Njoroge's study indicated that larger firms typically have greater access to resources and more diversified portfolios, which should theoretically enhance liquidity. However, the current findings suggest that as SACCOs grow in size, they may face increased operational complexities and inefficiencies, potentially leading to liquidity challenges.

This discrepancy highlights the need for further investigation into the specific dynamics of firm size and liquidity within the SACCO sector. It also underscores the importance of managing

growth carefully, ensuring that expansion does not come at the expense of financial stability and liquidity. This insight is crucial for policymakers and SACCO management as they strategize to balance growth with liquidity maintenance.

5. Conclusion and Recommendations

5.1 Conclusion

The study found that income from FOSA loan products significantly enhances DT SACCOs' liquidity, highlighting its role in financial stability. The null hypothesis stating no effect was rejected at a 95% confidence level. SACCOs should expand these products to strengthen liquidity and meet financial obligations. Similarly, income from FOSA investment products positively impacts liquidity, emphasizing its importance in SACCOs' financial health. The null hypothesis was rejected, reinforcing the need for strategic expansion of these investments while ensuring proper risk management. FOSA utility services also significantly boost liquidity, underscoring their value in financial sustainability. The rejection of the null hypothesis affirms that SACCOs should enhance these services to maintain liquidity and operational efficiency. Conversely, firm size negatively affects liquidity, suggesting that larger SACCOs face financial complexities that strain liquidity. The null hypothesis was rejected, indicating that as SACCOs grow, they must adopt robust liquidity management strategies to mitigate risks. The study thus concludes that, FOSA loan products, investment products, and utility services positively impact SACCO liquidity, supporting financial stability. However, larger SACCOs must address liquidity challenges through effective financial management. SACCOs should diversify income sources and implement prudent liquidity strategies to sustain operations and enhance service delivery.

5.2 Recommendations

The study recommends that SACCOs comply with regulatory liquidity requirements while investing excess cash in profitable ventures. The government should promote DT SACCO growth by creating a supportive environment and implementing favourable legislation. SASRA should re-evaluate investment regulations to enhance wealth maximization opportunities. Monitoring loan portfolio quality is crucial to reducing non-performing loans. Management should adopt flexible credit policies to mitigate moral hazard and adverse selection. Transparency measures, including disclosure guidelines and qualitative data reporting, should be strengthened to reduce information

asymmetry. SACCOs should maintain liquidity ratios that ensure net liquid assets cover short-term liabilities. This requires converting long-term assets into liquid cash and encouraging long-term savings. The financial department should collaborate with other departments to manage liquidity effectively. Boards should receive regular liquidity updates and act on significant changes. SACCOs must efficiently manage liquidity demand and supply to maintain stability and positive stakeholder relations. Implementing robust information systems for liquidity risk assessment, monitoring, and reporting is essential. Expanding the customer deposit base by targeting low-income earners and corporate clients can enhance liquidity. SACCOs should establish strong management structures, regularly evaluate credit policies, and strategically invest excess cash to improve financial stability and performance.

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