International Journal of
Finance
(IJF)

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CARI Journals

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 11, Issue No. 5, pp. 83 - 109, 2026
www.carijournals.org

Financial Stability of Public Universities in Kenya: Disaggregating The Contribution of Liquidity, Operational Performance and Asset Efficiency

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Accepted: 14th Aug, 2026, Received in Revised Form: 24th Aug, 2026, Published: 4th Sep, 2026

Abstract

Purpose: This study disaggregated the CFI and examined the underlying dimensions of financial condition in Kenyan public universities.

Methodology: The study used a longitudinal quantitative design, analyzing audited financial statements from 22 public universities for the 2018–2024 fiscal years, yielding 154 university-year observations. Financial condition was assessed using the CFI and its four component ratios: Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and Viability Ratio (VR). Descriptive and longitudinal analyses examined trends in the aggregate CFI and its constituent components.

Findings: The findings show that the aggregate CFI can obscure important differences across the underlying dimensions of financial condition. Although the sector's overall CFI indicates relative financial soundness, component-level analysis reveals persistent weaknesses in operating performance and asset productivity, as well as varying levels of liquidity resilience. The Viability Ratio offers limited differentiation because most universities reported no long-term debt.

Unique Contribution to Theory, Policy and Practice: The study contributes theoretically by demonstrating the limitations of relying exclusively on a composite financial health measure and the value of component-level analysis in revealing financial vulnerabilities that aggregation may obscure. In practice, the findings provide university managers with a more diagnostic basis for identifying specific areas requiring financial intervention. From a policy perspective, the study supports using disaggregated financial indicators alongside the CFI to monitor the financial resilience and sustainability of public universities in Kenya.

Keywords: *Composite Financial Index, Financial Stability, Public Universities, Financial Ratios*

JEL Codes: *G33, I21, M40*

1.1 Background of the study

Public universities are foundational to national development through knowledge production, workforce training, technological innovation, and socio-economic transformation. Their role in meeting the need for an educated workforce across all sectors of the economy has become even more crucial in the modern information age. To fulfill their mandates, universities must secure sufficient resources, financial and otherwise. Above all, they must have adequate financial resources and be in a stable financial condition. A financially stable organization has financial systems resilient enough to withstand shocks and unexpected disruptions. Such stability enables an organization to maintain steady cash flow, avoid excessive debt, and sustain its mission despite challenges in its operating environment (World Bank, 2020).

Financial stability is essential for universities to fulfill their mandates effectively. However, universities worldwide are increasingly facing financial difficulties that threaten their ability to fulfill their mandates (Price, 2023). Globally, public higher education systems face intensifying financial pressures driven by declining public subsidies, enrollment volatility, demographic shifts, and cost rigidities (ADB, 2023; OECD, 2023). In developed countries, declining enrollment, unpredictable public funding, and weak spending oversight have strained university finance (Nietzel, 2023).

In Africa, demand for university education has been rising due to a growing youth population. However, educational costs are rising, and per-student public funding has been decreasing, creating a funding gap for African universities (ACU, 2024). On average, African governments spend only about 0.5% of their National Gross Domestic Products (GDP) on higher education. This is significantly below the global average of 1.5%, thereby contributing to the financial difficulties faced by the universities (ADB, 2023). Moreover, the United Nations Economic Commission for Africa (UNECA) posits that African universities attract little private-sector financing and rely heavily on inadequate public domestic funding from national treasuries (UNECA, 2023). Consequently, nearly all higher education institutions in Africa are experiencing increased pressure due to rising student numbers and the rising costs of training and research activities (Worldbank, 2020).

In Kenya, the education sub-sector has experienced phenomenal growth, with the number of universities rising from 33 in 2012 to 74 by 2024. A corresponding increase in student enrollment accompanied the expansion in universities, with total university enrollment reaching 628,541 by 2024, up from 240,551 in 2012, representing a 161% increase. Public universities have been dominant, hosting roughly three-quarters of all students (CUE, 2024). Despite the rise in student enrollment, Kenyan public universities have continued to rely primarily on government financial support to fund their operations.

As government funding, however, per eligible university student has generally decreased, even as instructional and other operating costs have risen due to rising living costs, this has created a gap

between falling revenue and rising costs, leading many universities to the brink of bankruptcy (KIPPRA, 2023). The financial situation in Kenya's public universities was so dire that the country's Auditor General reported that all 11 of Kenya's most prominent public universities were technically insolvent as of June 2020. The continued operation of these universities depended on the assumption of ongoing financial support from the national government, bankers, and creditors (OAG, 2022).

The exact financial condition of the Kenyan public universities, including whether they are in financial distress and to what extent, can be ascertained in various ways. One of the most comprehensive and widely used composite measures of financial health in higher education is the Composite Financial Index (CFI) (Prager et al., 2010). The CFI is multi-dimensional and combines four core ratios, namely Primary Reserve, Net Operating Revenue, Return on Net Assets, and Viability, into a composite score that reflects overall stability. Thus, it provides a broader picture than relying on profitability, liquidity or solvency alone.

Reliance on aggregated CFI values may, however, obscure important divergences among liquidity, operating performance, and asset efficiency. While sector-level financial metrics may present one picture of the extent of financial difficulties in public universities, it is vital and more informative to examine the underlying financial structural dynamics embedded in the CFI component ratios.

1.2 Problem Statement

Kenyan public universities face mounting financial pressure arising from declining real government funding, rising operational costs and growing enrolment. In response, universities have increasingly adopted various strategies to strengthen their financial position. However, concerns persist regarding their capacity to achieve and sustain financial stability. The Composite Financial Index (CFI) has emerged as a widely used measure of universities financial health, providing an aggregate assessment based on liquidity, operating performance, asset efficiency and debt capacity (Prager et al., 2010). However, by aggregating these dimensions into a single score, the CFI may conceal underlying vulnerabilities, imbalances and emerging risks within individual components, potentially resulting in an incomplete assessment of an institution's actual financial condition.

Despite the growing application of the CFI in higher education finance, limited empirical research has examined how its underlying components, namely, the Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA) and Viability Ratio (VR), individually contribute to financial stability in Kenyan public universities. Consequently, it remains unclear whether observed financial stability reflects strong operating performance, effective asset utilization, adequate liquidity reserves, or a combination of these factors. This gap is particularly important where apparent financial stability may be sustained through the use of accumulated reserves rather than through financially sustainable operations. Disaggregating the

CFI is therefore necessary to reveal the specific sources of financial strength and vulnerability and to provide a more nuanced understanding of financial stability in Kenyan public universities.

1.3 Objectives

This study sought to analyze the structural financial patterns across Kenyan public universities by disaggregating financial stability, measured by the Composite Financial Index, over the period 2018-2024. Specifically, it sought to:

1. Determine the financial stability of Kenyan Public universities using the Composite Financial Index between 2018 and 2024.
2. Disaggregate the CFI into its component ratios, measuring levels of liquidity, operating performance, efficiency in the use of assets, and solvency among Kenya's public universities between 2017 and 2024.
3. Determine how component-level divergences shape the overall financial stability of public universities in Kenya.

2. Literature Review

2.1 Conceptualizing Financial Sustainability in Higher Education

Financial sustainability is typically defined as the ability of higher education institutions to sustain long-term operations while fulfilling their academic missions of teaching, research, and community engagement (Prager et al., 2010; Johnstone, 2021). Other literature broadens this definition, emphasizing the need to balance revenues, expenditures, and strategic objectives (OECD, 2023; Marginson & Considine, 2020). Marginson (2020) underscores the importance of institutional adaptability in responding to evolving funding environments. In developing countries, universities face heightened financial challenges due to structural constraints, including limited fiscal capacity, regulatory restrictions, and weak institutional autonomy (UNECA, 2023). Kenyan public universities exemplify these dynamics, facing mounting financial pressure despite efforts to diversify revenue streams (CUE, 2024; KNBS, 2024).

Measures of financial stability have evolved from reliance on individual financial ratios to composite indices that integrate multiple dimensions of performance (Kimathi & Irungu, 2024; OECD, 2025). Composite indices offer advantages in simplicity and comparability (PricewaterhouseCoopers, 2024). However, they can mask internal imbalances, as strong performance in one component can offset weaknesses in another, and vice versa (Johnstone, 2021). Another limitation is that composite measures tend to obscure causal relationships, making it difficult to identify the actual drivers of financial outcomes (Teixeira & Dill, 2022). Furthermore, these indices are susceptible to misleading policy conclusions if interpreted without examining the underlying dynamics (PricewaterhouseCoopers, 2024). Effective financial stability measures therefore require disaggregating composite indices and analyzing interactions among their components (Teixeira & Koryakina, 2023). This is particularly relevant in higher education, where financial stability is shaped by complex, interdependent factors.

2.2 **The Composite Financial Index (CFI)**

The Composite Financial Index (CFI), developed by Prager et al. (2010), is a widely used framework for assessing the overall financial health of higher education institutions. It combines four key ratios, namely the Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and Viability Ratio (VR).

2.2.1 **Primary Reserve Ratio (PRR): Measure of Liquidity and Financial Flexibility**

The Primary Reserve Ratio (PRR) is a core component of the Composite Financial Index (CFI) and a key indicator of an institution's short- to medium-term financial resilience. It measures how long a university can sustain operations using its expendable financial reserves without additional revenue. Calculated as expendable net assets divided by total operating expenses, the PRR reflects an institution's financial flexibility and capacity to absorb shocks, manage unexpected disruptions, and maintain operational continuity. For example, a PRR of 0.40 indicates reserves equivalent to approximately 40% of annual operating expenses, or about 4.8 months of expenditure coverage (Prager et al., 2010).

Higher PRR values indicate stronger liquidity and greater capacity to absorb revenue volatility and expenditure pressures, whereas low or negative values signal limited financial flexibility and heightened vulnerability to financial distress. However, excessively high reserves may also indicate underutilized resources that could otherwise fund strategic investments in teaching, research, and infrastructure.

2.2.2 **Net Operating Revenue Ratio (NORR): Measuring Operational Sustainability**

The Net Operating Revenue Ratio (NORR) is a central component of the Composite Financial Index (CFI) and measures an institution's operational sustainability. It assesses whether operating revenues are sufficient to cover operating expenses and sustain core activities without persistent deficits. Calculated as net operating income divided by total operating revenues, the ratio standardizes operating performance across institutions and over time. A positive NORR indicates an operating surplus, while a negative value indicates an operating deficit.

A NORR of approximately 2% (0.02) is commonly regarded as a modest but healthy level, providing capacity for reinvestment, absorption of financial shocks and maintenance of financial stability (Prager et al., 2010). Higher values indicate stronger operating performance, while values near zero suggest limited financial cushioning. Persistent negative NORR is concerning because operating deficits can progressively erode reserves and weaken long-term financial sustainability. However, temporary deficits may arise from deliberate investments or expansion and should therefore be interpreted alongside the other CFI components.

2.2.3 Return on Net Assets (RONA): Measuring Asset Efficiency and Value Creation

The Return on Net Assets (RONA) is a key component of the Composite Financial Index (CFI) that assesses how effectively a university utilizes its asset base to generate financial returns and institutional value. In higher education, RONA is viewed not simply as a profitability measure but as an indicator of asset productivity and stewardship. A strong RONA suggests effective management of institutional resources, while a weak or negative RONA may indicate underperformance or inefficiencies in asset utilization.

RONA is calculated as the change in net assets divided by total net assets. The numerator reflects the annual surplus or deficit, while the denominator represents the institution's accumulated resource base. The ratio therefore indicates the change in institutional value relative to the resources invested and, where appropriate, may be adjusted to exclude exceptional or non-operating items.

A positive RONA indicates growth in net assets and strengthens the institution's capacity for reinvestment and long-term sustainability, while a negative RONA indicates erosion of the asset base if sustained. Unlike some other CFI components, RONA does not have a universally fixed threshold; however, consistently positive values are generally desirable. It should therefore be interpreted alongside PRR, NORR and the Viability Ratio to provide a comprehensive assessment of financial health (Prager et al., 2010).

2.2.4 Viability Ratio (VR): Measuring Debt Capacity and Long-Term Sustainability

The Viability Ratio (VR) is a critical component of the Composite Financial Index (CFI) that assesses an institution's long-term financial sustainability by measuring its capacity to meet outstanding debt obligations using available expendable resources. It focuses on solvency and capital structure, indicating whether a university can repay its long-term liabilities if required. In higher education finance, the VR reflects the balance between debt and financial flexibility, capturing an institution's ability to support strategic investments such as infrastructure expansion or research facilities without compromising financial stability. As such, it is a key indicator of financial risk and resilience in the face of long-term obligations.

The Viability Ratio is the ratio of expendable net assets to long-term debt. Expendable net assets include unrestricted and expendable restricted resources that can be mobilized to service debt, whereas long-term debt includes all obligations due more than one year, such as loans and bonds. This ratio indicates how many times an institution could, in theory, cover its debt with available financial resources. A higher ratio suggests greater financial strength and lower leverage, while a lower ratio indicates higher financial risk and limited debt repayment capacity.

A VR of 1.0 or higher is commonly considered a minimum benchmark, indicating that the institution has sufficient expendable resources to fully cover its long-term debt (Prager et al., 2010). Ratios above 1.25–1.50 are generally considered strong, indicating a comfortable debt position

and enhanced borrowing capacity for future investments. Conversely, a VR below 1.0 signals potential financial vulnerability, suggesting that the institution may struggle to meet its debt obligations without relying on future revenues or external support. Very low or negative values indicate significant solvency risk and may constrain the institution's ability to access additional financing. However, as with other CFI components, the VR should be interpreted alongside PRR, NORR, and RONA to provide a balanced, comprehensive assessment of institutional financial health and long-term sustainability.

2.2.5 Integrating the Components: Toward a Comprehensive Understanding of Financial Sustainability

A comprehensive understanding of financial sustainability in higher education emerges not from any single indicator but from the integrated analysis of the four components of the Composite Financial Index (CFI), namely, the Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and Viability Ratio (VR). Each ratio captures a distinct yet interrelated dimension of financial health, including liquidity, operational performance, asset efficiency, and debt capacity. Together, these metrics provide a multidimensional view of how universities generate, manage, and sustain financial resources over time. The strength of the CFI framework lies in its integrative capacity, enabling stakeholders to move beyond fragmented assessments toward a holistic evaluation of institutional financial condition (Prager et al., 2010; OECD, 2024).

Importantly, interactions among these components reveal deeper insights into institutional financial dynamics. For instance, a university may exhibit strong liquidity (high PRR) but weak operational performance (low NORR), indicating that although it has reserves, it is not generating sufficient surpluses to sustain them. Similarly, a positive RONA alongside a low VR may suggest efficient asset utilization but excessive reliance on debt financing, raising concerns about long-term solvency. These interdependencies underscore the importance of examining trade-offs and complementarities across financial dimensions. Financial sustainability, therefore, is not simply about achieving high values across all ratios, but about maintaining a balanced financial profile aligned with institutional strategy and risk tolerance.

Integrating the CFI components enables more informed decision-making for institutional leaders and policymakers. Disaggregated analysis identifies specific areas of strength and vulnerability, guiding targeted interventions such as improving revenue generation (NORR), optimizing asset use (RONA), strengthening liquidity buffers (PRR), or restructuring debt (VR). This approach is especially valuable in resource-constrained environments, such as public universities in developing countries, where financial pressures are acute and strategic prioritization is essential. Ultimately, integrating CFI components supports a more nuanced, actionable understanding of financial sustainability, enhancing institutions' capacity to achieve long-term resilience while fulfilling their academic missions.

However, other scholars emphasize that reliance on the aggregate CFI score alone may obscure important internal dynamics, as strengths in one component can offset weaknesses in the others and vice versa. Consequently, there is increasing recognition of the need to disaggregate the CFI to better understand the underlying drivers of financial stability (Johnstone, 2021; Hanover, 2023; Koryakina, 2020). This is particularly critical in developing-country contexts, where financial constraints and structural challenges are more pronounced. Disaggregation enables researchers and policymakers to identify specific areas of vulnerability or strength, thereby enabling more targeted and effective strategies to enhance institutional resilience and long-term sustainability.

3. Methodology

3.1 Research Design and Study Sample

The study used a longitudinal quantitative design to examine the financial stability of public universities in Kenya and decompose the Composite Financial Index (CFI) into its component ratios. This design enabled comparisons of financial stability across institutions and over time, spanning the seven financial years from 2018 to 2024.

The target population comprised 37 public universities in Kenya. Purposive sampling was used to select institutions with sufficiently consistent audited financial information throughout the study period. The final sample included 22 universities, yielding a balanced panel of 154 university-year observations (22 universities × 7 years).

3.2 Data Sources and Collection

The study relied on secondary financial data, primarily from the audited annual financial statements and reports of the sampled universities. A structured data-extraction schedule was used to collect the financial information required to calculate the CFI and its four component ratios.

3.3 Variable Measurement and Operationalization

3.3.1 Primary Reserve Ratio

The Primary Reserve Ratio (PRR) constitutes a central pillar of the Composite Financial Index (CFI) framework and provides a direct measure of institutional liquidity and financial flexibility. Conceptually, the PRR measures the extent to which a university's expendable net assets can cover its operating expenditures, thereby reflecting its capacity to absorb financial shocks and maintain operational continuity (Prager et al., 2010). In higher education finance, the PRR is widely interpreted as an indicator of "days cash on hand," with a minimum benchmark of approximately 0.4 (equivalent to about 140 days or one semester) considered necessary for institutional sustainability (KPMG, 2021; NACUBO, 2022). In this study, the PRR is operationalized on a standardized scale, enabling comparative analysis across institutions and over time. The ratio is calculated as PRR = Expendable Net Assets / Total Expenses

3.3.2 Net Operating Revenue Ratio

The Net Operating Revenue Ratio (NORR) is a key component of the Composite Financial Index (CFI) and a critical indicator of institutional financial performance, measuring the extent to which a university generates operating surpluses relative to its total revenues. Within the Composite Financial Index (CFI) framework, NORR reflects operational sustainability, indicating whether institutions are living within their means or relying on reserves and external support to finance ongoing activities (Prager et al., 2010). A positive NORR signifies a surplus position, while a negative ratio indicates that operating expenses exceed revenues, signaling structural deficits. The ratio is calculated as NORR = Operating Surplus / Operating Revenue.

3.3.3 Return on Net Assets Ratio

The Return on Net Assets (RONA) is a fundamental measure of financial performance for higher education institutions, indicating how effectively universities generate returns on their asset base. As a component of the Composite Financial Index (CFI), RONA reflects asset efficiency and long-term financial sustainability, signaling whether institutional resources are used productively to generate surpluses. A positive RONA indicates that assets are yielding returns, whereas a negative value suggests underperformance and potential inefficiencies in asset utilization (Prager et al., 2010). The ratio is calculated as RONA = Change in Net Assets / Net Assets.

3.3.4 Viability Ratio

The viability ratio is a key indicator in the Composite Financial Index (CFI) framework, measuring how well an institution's expendable net assets cover its long-term debt obligations. Conceptually, it reflects debt capacity and financial leverage, indicating whether a university can repay its outstanding obligations using available resources (Prager et al., 2010). A viability ratio greater than 1.0 typically indicates strong debt coverage, while a value below 1.0 indicates limited capacity to meet long-term liabilities. VR = Expendable Net Assets / Long-Term Debt.

Table 1 - Operationalization of the Study Variables

Variable	Construct	Measurement / Formula	Operational Definition	Source
Primary Reserve Ratio (PRR)	Liquidity	Expendable Net Assets / Total Operating Expenses	Measures financial reserves available to sustain operations	Prager et al. (2010)
Net Operating Revenue Ratio (NORR)	Operating Performance	Net Operating Income / Total Operating Revenue	Indicates surplus or deficit position	Barr (2020); NACUBO (2022)
Return on Net Assets (RONA)	Asset Efficiency	Net Assets / Total Net Assets	Measures the effectiveness of asset utilization	Clark (2020)
Viability Ratio (VR)	Debt Capacity	Expendable Net Assets / Long-Term Debt	Measures the ability to repay long-term obligations	Prager et al. (2010)

3.3.5 The Computation and Interpretation of the Composite Financial Index (CFI)

The Composite Financial Index (CFI) provides a single measure of institutional financial health by combining the four component ratios, namely the Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and Viability Ratio (VR), on a common scale. Because the four ratios are expressed in different units, they cannot be added directly. The CFI methodology therefore converts each ratio into a strength factor before applying the prescribed weighting scheme. The CFI computation takes four distinct steps. First, each of the four financial ratios is calculated from the institution's audited financial statements. Second, each ratio is converted into a Strength Factor (SF) using its respective benchmark value. Third, the strength factor is multiplied by the applicable weighting factor. Finally, the weighted component scores are summed to obtain the institution's CFI (Prager et al., 2010). The standard CFI calibration assigns benchmarks as shown in Table 2:

Table 2 CFI Strength-Factor (SF) Calibration and Weighting

CFI Component	Benchmark for Strength Factor 1	Benchmark for Strength Factor 3	Benchmark for Strength Factor 10	Standard Weight
Primary Reserve Ratio (PRR)	0.133	0.4	1.33	35%
Net Operating Revenue Ratio (NORR)	1.30%	4.00%	13.00%	10%
Return on Net Assets (RONA)	2.00%	6.00%	20.00%	20%
Viability Ratio (VR)	0.417	1.25	4.17	35%
Total				**100%**

Source: Adapted from the Composite Financial Index methodology of Prager et al. (2010)

Table 2 presents the weighted score for each component, computed as WSj = SFj*Wj, where WSj is the weighted score for component j, SFj is the strength factor for component j, and Wj is the weight for component j. The CFI is then calculated as follows for an institution with long-term debt:

CFI = SF{PRR}*0.35 + SF{NORR}*0.10 + SF{RONA}*0.20 + SF{VR}*0.35. The resulting weighted scores are summed to produce the final CFI as the sum of WS{PRR}+WS{NORR}+WS{RONA}+WS{VR}.

When the institution has no long-term debt, the conventional CFI methodology does not treat the absence of debt as a missing observation. Instead, the weight assigned to the Viability Ratio is redistributed among the remaining three ratios. Under the no long-term-debt specification, PRR receives 55%, NORR 15%, and RONA 30%, with the three components collectively accounting for 100% of the CFI. Accordingly, for an institution without long-term debt, the CFI is calculated as CFI = (SF*{PRR}*0.55) + (SF*{NORR}*0.15) + (SF*{RONA}*0.30).

The CFI methodology allows strengths in one financial dimension to offset weaknesses in another. Consequently, the aggregate CFI reflects the institution's overall financial position rather than the performance of any single financial ratio. However, this compensatory feature also means that weaknesses in an individual component may be obscured by strengths in other components. This is the principal reason for disaggregating the CFI in the present study. Therefore, the aggregate CFI was not treated as sufficient evidence of financial health. Rather, the study disaggregated the CFI into PRR, NORR, RONA, and VR and examined their individual levels and trends to identify the specific sources of financial strength, vulnerability, and divergence underlying the aggregate financial position of Kenyan public universities.

The standard threshold for institutional financial health is a CFI score of 3.0. A score above 3 indicates growing financial capacity and greater potential for strategic investment, whereas a score

below 3 signals financial vulnerability that requires management attention. The CFI framework typically uses 1 to represent financial stress, 3 to represent relative financial health, and 10 to represent great financial success. For this study, CFI scores were grouped into five categories to provide a more insightful categorization of the financial state of Kenyan public universities, as shown in Table 3.

Table 3 Classification and Interpretation of CFI Scores

CFI Score	Financial Classification	Interpretation
< 1.0	Financially distressed	Indicates serious financial weakness and limited capacity to sustain operations without significant corrective action or additional financial support.
1.0–2.9	Financially vulnerable	Indicates that the institution has some financial capacity but remains exposed to financial shocks and has limited resilience.
3.0–4.9	Stable but constrained	Indicates an institution that has attained the minimum threshold of financial health but has limited capacity for strategic investment or to absorb substantial financial shocks.
5.0–6.9	Financially healthy	Indicates a relatively strong financial position, with adequate capacity to sustain operations and absorb moderate financial pressures.
≥ 7.0	Financially strong	Indicates a strong financial position with substantial financial flexibility and capacity to withstand shocks and support strategic investment.

3.4 **Data Analysis**

The analysis was conducted at both the aggregate and component levels. First, the CFI was calculated for each university and financial year, and annual sector-level means were used to assess the overall trajectory of financial stability from 2018 to 2024.

Second, the CFI was disaggregated into PRR, NORR, RONA, and VR. Descriptive statistics, including annual means and institutional-level observations, were used to assess the magnitude and direction of each component.

Third, trends in the component ratios were compared with movements in the aggregate CFI to identify instances of component-level divergence. Particular attention was given to cases in which a relatively favorable CFI coincided with weakness in one or more underlying ratios. This approach enabled the study to determine whether observed financial stability was supported by operating performance and asset productivity or primarily by accumulated financial reserves.

Institution-level comparisons were also conducted to identify differences in the financial profiles of universities that might be obscured by sector-level averages. The analysis was therefore primarily descriptive and longitudinal, focusing on patterns and relationships among the CFI components rather than estimating causal relationships.

3.5 **Data Quality and Ethical Considerations**

Data quality was enhanced by using audited financial statements, applying the specified financial-ratio formulas consistently, and verifying extracted figures against the original financial reports. Unusually high or low observations were reviewed against the underlying financial statements rather than automatically excluded, since they could reflect genuine institutional financial conditions.

The study distinguished between unavailable information and genuinely absent financial items. In particular, universities reporting no long-term debt were treated as having no debt rather than as missing observations for the Viability Ratio.

The study used institutional financial information and did not involve human participants. Financial information was reported objectively, and institutional sources and methodological frameworks were appropriately acknowledged.

4. Results

4.1 The Composite Financial Index

Figure 1 presents the longitudinal trend in the mean Composite Financial Index (CFI) for Kenyan public universities from 2018 to 2024. The figure shows both temporal dynamics, indicating that the sector maintained moderate financial stability over the study period. However, it also points to a post-2019 decline, suggesting increasing financial strain across universities.

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 11, Issue No. 5, pp. 83 - 109, 2026
www.carijournals.org

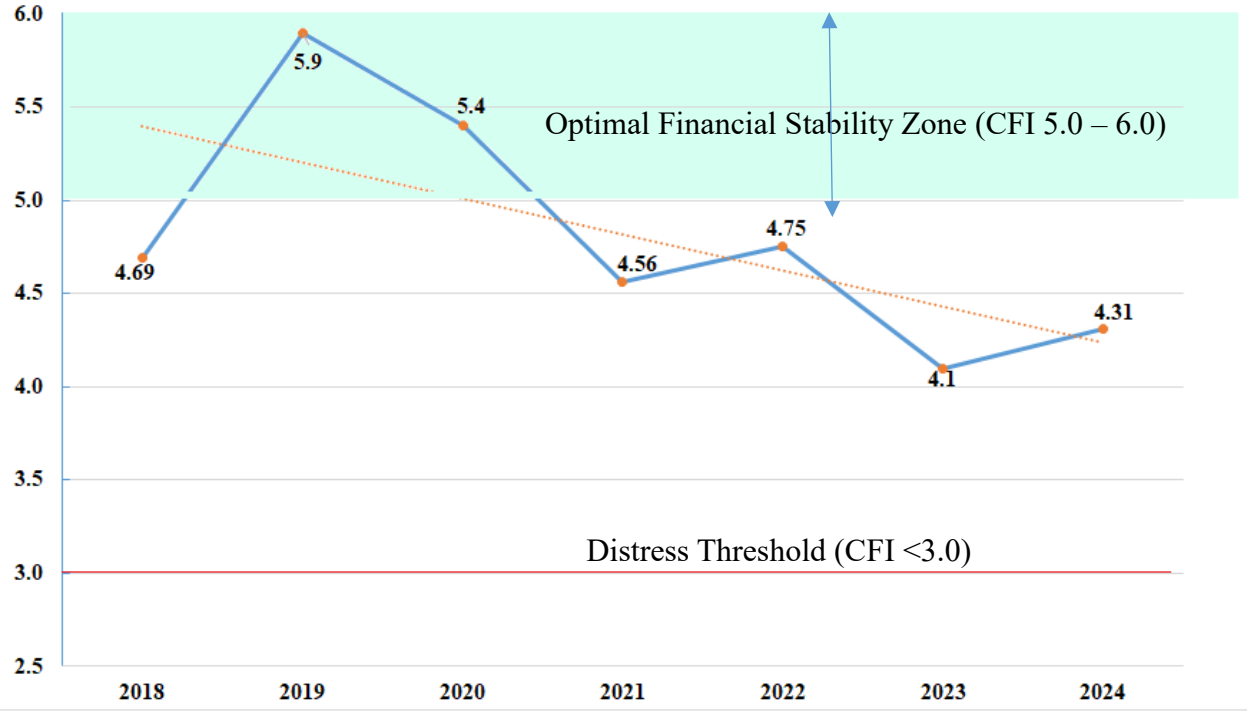

Figure 1 Mean CFI Across Public Universities in Kenya 2018-2024

At the start of the period, the sector recorded a mean CFI of 4.69 in 2018, placing it in the "stable but constrained" category. This indicated that, on average, universities had sufficient financial capacity to sustain operations, albeit with limited flexibility to absorb shocks or invest in long-term strategic initiatives. The situation improved markedly in 2019, when the mean CFI rose sharply to 5.90, entering the "financially healthy" zone (CFI 5.0–6.9). This peak represented the strongest financial position observed during the study period and suggested a temporary alignment of favorable conditions. However, this upward trajectory was not sustained, and financial stability began to decline steadily in 2020. The mean CFI fell to 5.40 in 2020 and further to 4.56 in 2021, indicating a transition from "financially healthy" to "stable but constrained." This shift was particularly significant, as it reflected a loss of financial resilience at the sector level. The decline coincided with a period of macroeconomic disruptions, including the effects of the COVID-19 pandemic, which significantly affected university revenues, particularly tuition-related income, auxiliary services, and research activities.

The downward trend continued into 2022, with the mean CFI at 4.75, followed by a more pronounced decline to 4.10 in 2023, the lowest point in the series. Although still above the formal distress threshold of CFI < 3.0, this level signaled a concerning erosion of financial stability. At this point, the sector was operating dangerously close to vulnerability, with diminished capacity to absorb financial shocks. The decline to 4.10 suggested tighter liquidity positions, lower operating surpluses, and greater pressure on institutional reserves. In 2024, a slight recovery was observed,

with the mean CFI rising marginally to 4.31. While this improvement may indicate early signs of stabilization, it remained insufficient to restore the sector to the optimal stability zone (CFI 5.0–6.0). Thus, the overall trajectory from 2019 to 2024 can be characterized as a decline with only partial recovery, reinforcing the argument that the financial environment for Kenyan public universities had become increasingly constrained.

4.2 Component Ratios

4.2.1 Primary Reserve Ratio (Liquidity)

The Primary Reserve Ratio analysis revealed that, while Kenyan public universities maintained, on average, adequate liquidity buffers (mean of 4.52), there was a clear and sustained decline in expendable reserves over the study period. A longitudinal analysis of the mean PRR shows relative stability followed by a gradual decline. As shown in Figure 2, the sector's mean PRR increased slightly from 4.55 in 2018 to 4.76 in 2019, then stabilized at 4.63 in 2020 and 4.75 in 2021. This initial phase suggests that universities maintained adequate liquidity buffers, enabling them to meet operational obligations and absorb moderate financial shocks. However, from 2022 onward, the trend shifts downward, with the mean PRR declining to 4.49 in 2022, 4.29 in 2023, and further to 4.20 in 2024, yielding an overall mean of 4.52 for the study period. The downward trajectory is analytically significant. While the sector remains above minimum liquidity thresholds, the consistent erosion of PRR indicates that universities were increasingly drawing down their expendable reserves. This pattern suggests that operating expenditures were outpacing internally generated surpluses, forcing universities to rely on accumulated reserves to sustain operations. This finding aligns with recent global evidence indicating that universities were facing tightening liquidity conditions due to declining public funding and rising operational costs (OECD, 2023; World Bank, 2022).

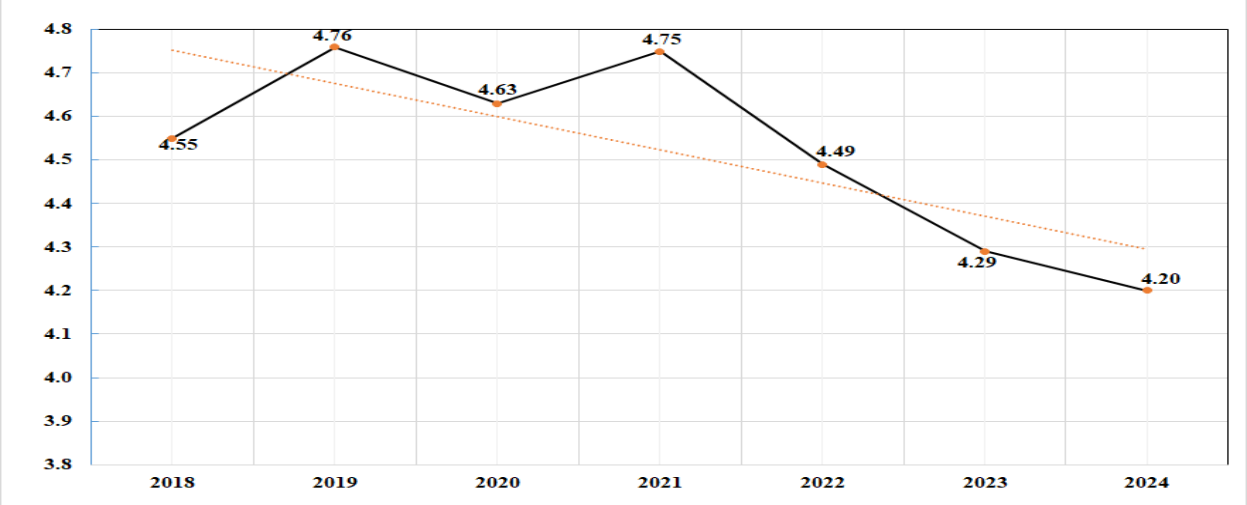

Figure 2 Mean Primary Reserve Ratio (PRR) Across Public Universities in Kenya 2018-2024

Despite aggregate trends, the PRR data revealed substantial heterogeneity across universities, underscoring the uneven distribution of financial resilience within the sector. A group of universities, namely UON, DKUT, CU, TUM, SEKU, and JOOUST, exhibited consistently high PRR values (approximately 5.0–5.5), indicating strong liquidity and sufficient reserves to withstand financial shocks and sustain long-term operations. In contrast, several universities demonstrated moderate liquidity levels, including KU, MU, MSU, KSU, and MMARAU, with PRR values in the 4.0–5.0 range. These universities are more vulnerable to adverse shocks, particularly amid declining revenue streams. More concerning is the subset of universities that exhibited low or declining PRR values, including JKUAT (2.69), TUK (2.30), UOE (2.74), and MMU (2.00). These universities had limited liquidity buffers and were highly vulnerable financially. The case of EU was particularly critical, with a negative mean PRR (-0.16), indicating that expendable net assets are insufficient to cover operating expenses. Such a condition signals severe financial distress and raises concerns about institutional solvency and sustainability.

The PRR data further revealed notable volatility in liquidity positions across certain institutions. For example, TUK's PRR declined sharply from 4.77 in 2018 to -0.32 in 2024, indicating a dramatic erosion of reserves. Similarly, the EU exhibited a persistent downward trajectory, culminating in highly negative PRR values by 2024. MMU also showed a pattern of declining liquidity, with only a modest recovery in the final year. These patterns suggest that liquidity risk was not uniformly distributed but concentrated among specific institutions, likely reflecting differences in revenue structures, cost management practices, and governance capacity. This volatility reinforces the importance of robust financial management systems and diversified revenue portfolios in sustaining liquidity (Hearn, 2021; Hanover Research, 2023).

4.2.2 Net Operating Revenue Ratio (Operating Stability)

The Net Operating Revenue Ratio analysis revealed a persistent pattern of operating deficits across Kenyan public universities, with the sector failing to achieve a positive aggregate balance in any year during the study period (sector mean of -0.21). As shown in Figure 3, the sector's NORR mean remained below zero throughout the study period. This structural imbalance between revenues and expenditures indicates that the universities were operating beyond their financial means and relying on reserve depletion and external support to sustain operations. The pronounced deficit in 2021, followed by continued volatility through 2024, underscores the fragility of the sector's financial model. These findings provide strong evidence that financial sustainability remains elusive.

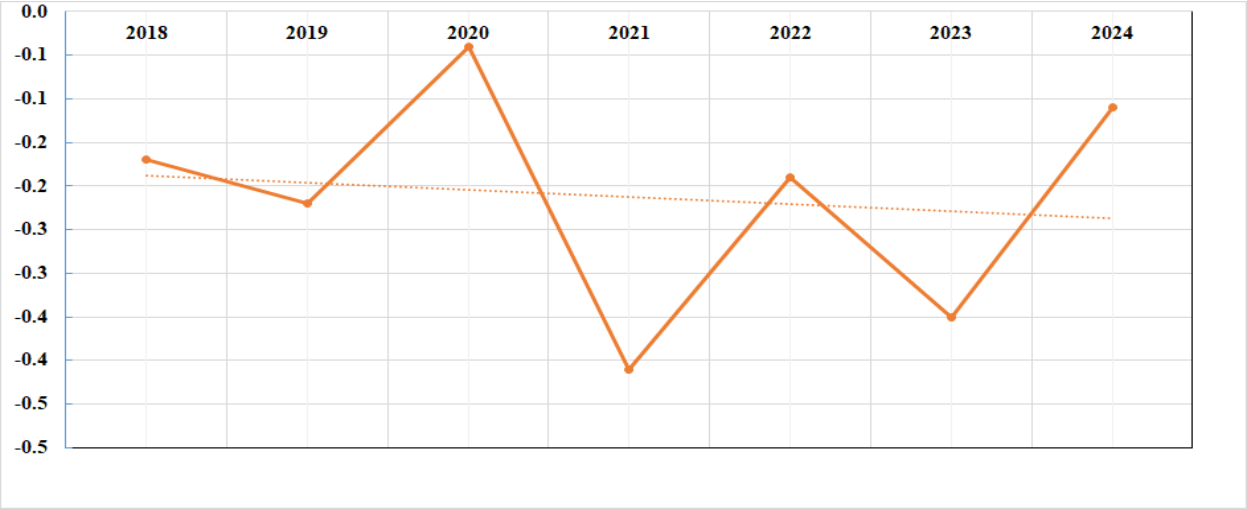

Figure 3 Mean Net Operating Revenue Ratio (NORR) Across Kenyan Public Universities 2018-2024

A striking feature of Figure 3 is the persistent negative NORR across all years, indicating that, at the aggregate level, Kenyan public universities consistently operated at a deficit. The mean NORR begins at approximately -0.22 in 2018, suggesting moderate deficits that are likely manageable within existing financial reserves. However, the deficit deepens slightly in 2019 to around -0.26, indicating a widening gap between revenues and expenditures. Despite this deterioration, the deficit's magnitude during these early years remains within a range that could be absorbed through internal reserves, particularly given the relatively strong liquidity positions observed in the Primary Reserve Ratio (PRR) during the same period. A notable shift occurred in 2020, when the NORR improved significantly to approximately -0.08, representing the closest point to break-even across the study period. This improvement suggested a temporary alignment between revenues and expenditures, potentially driven by cost containment measures, reduced operational activity during the COVID-19 pandemic, or short-term adjustments in funding flows. While this near-equilibrium position was encouraging, it proved short-lived, as the following year revealed a dramatic reversal, with operating performance deteriorating to the most severe level observed in 2021, as the NORR plunged to approximately -0.45, the lowest value observed in the series.

The sector exhibited a partial recovery in 2022, with the NORR improving to approximately -0.19. However, this improvement was not sustained, as the NORR declined again in 2023 to around -0.40, indicating renewed financial pressure. The re-emergence of large deficits underscored the volatility of financial performance and suggests that the underlying structural issues remained unresolved. In 2024, the NORR improves once more to approximately -0.12, indicating a movement toward operational balance. While this improvement is significant relative to the deficits observed in 2021 and 2023, it still falls short of achieving a positive ratio. Thus, despite fluctuations, the overarching pattern is a persistent operating deficit with intermittent, unstable

recovery. This volatility reflects a sector that is struggling to achieve sustainable financial equilibrium.

4.2.3 Return on Net Assets (Asset Productivity)

The trend in Figure 4 offers important insights into how Kenyan public universities have performed on the Return on Net Assets (RONA) over the period 2018–2024. The sector began 2018 with moderate performance, with a mean RONA of about 0.25. This indicated that universities were generating modest returns on their asset base, suggesting a relatively stable operating environment in which institutional investments and resources contributed positively to financial outcomes. However, this stability was followed by a sharp improvement in 2019, when the mean RONA rose to about 1.20, the highest value observed over the study period. This peak suggested a period of strong financial performance in which universities effectively leveraged their assets to generate substantial returns. However, this strong performance proved unsustainable, as RONA declined sharply in 2020, with the mean RONA falling to approximately 0.65, indicating a substantial reduction in asset returns. While still positive, this decline marked the beginning of a downward trajectory that continued into subsequent years. The situation deteriorated further in 2021, where the mean RONA fell to approximately 0.10, representing a near-break-even position, before making a modest recovery in 2022, with the mean RONA increasing to approximately 0.30.

The downward trend resumed in 2023, where the mean RONA declined to approximately -0.10, marking the first instance of negative returns within the study period. This shift into negative territory was particularly significant, as it indicated that universities were no longer generating sufficient returns to justify their asset base. Instead, assets were underutilized or failing to produce adequate financial returns. The negative RONA continued into 2024 at approximately -0.05, suggesting a slight improvement over 2023 but still indicating underperformance. The persistence of negative returns underscored the challenges universities faced in restoring asset productivity. Although the magnitude of the deficit was relatively small, the continued inability to achieve positive returns raises concerns about the long-term sustainability of current asset utilization strategies.

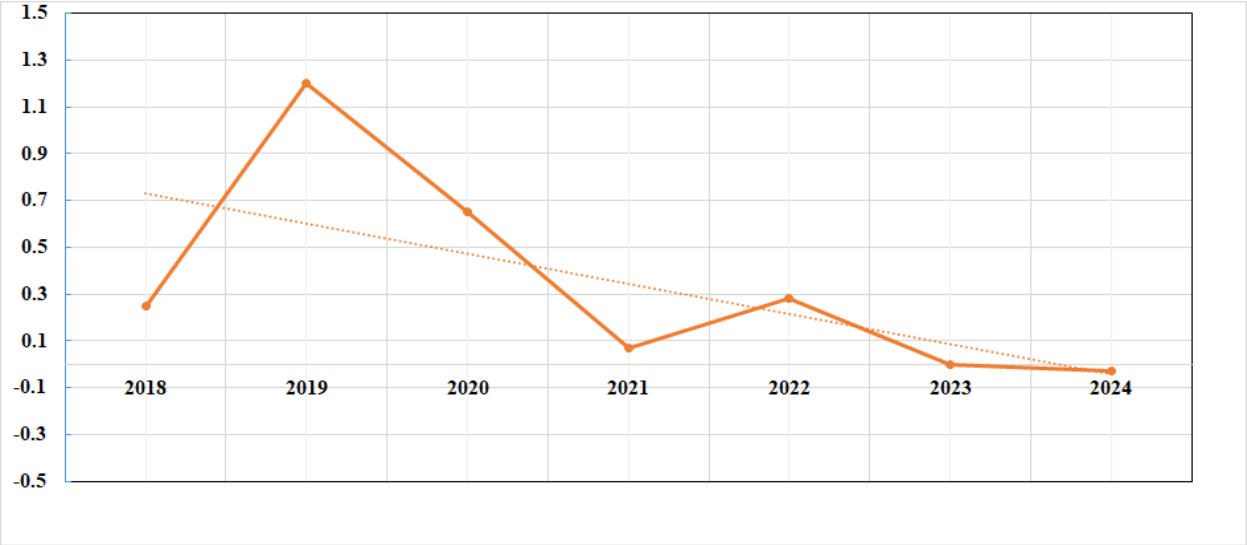

Figure 4 Mean Return on Net Assets Ratio Across Kenyan Public Universities 2018-2024

4.2.4 Viability Ratio (Solvency)

The viability ratio was applicable only to Jomo Kenyatta University of Agriculture and Technology (JKUAT), as all other universities in the sample reported no long-term debt over the study period. For purposes of determining sector-wide characteristics, the VR was ignored or deemed absent. The dataset showed that nearly all Kenyan public universities operated without long-term debt financing. This was a distinctive structural characteristic with important implications. On the one hand, the absence of debt eliminates exposure to financial risk associated with leverage, such as interest obligations and refinancing pressures. On the other hand, it suggests limited use of financial instruments for capital development, potentially constraining universities' ability to invest in infrastructure, research capacity, and income-generating assets.

Unlike many higher education systems worldwide, where debt financing is used strategically to fund expansion and innovation, Kenyan public universities have relied predominantly on government funding and internally generated resources. This conservative financing structure may reflect regulatory constraints, risk aversion, or limited access to credit markets. However, it also raises questions about the sector’s capacity to scale operations and diversify revenue sources through strategic investments.

4.3 Discussion

This section provides a comprehensive synthesis of all empirical findings derived from the figures on the Composite Financial Index (CFI), Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and Viability Ratio (VR).

4.3.1 Composite Financial Index (CFI): Stability with Structural Decline

The CFI trend captured the sector's overall financial condition. The 2019 peak (CFI ≈ 5.9), though not sustained thereafter, placed Kenyan public universities in the "financially healthy" category. A steady decline followed from 2020 to 2023, with only a modest recovery in 2024, yielding a mean CFI of about 4.8, which is interpreted as "stable but constrained" (Prager et al., 2010). This trajectory reflected a deteriorating financial situation in which institutions remain above financial distress thresholds but are increasingly constrained in their financial flexibility. Similar patterns have been observed globally, with universities maintaining operational continuity despite weakening financial performance amid structural pressures such as declining public funding and rising operational costs (OECD, 2023; World Bank, 2022). Thus, the CFI trend suggests that financial stability was being preserved, but at a diminishing rate.

4.3.2 Primary Reserve Ratio (PRR): Liquidity as the Core Stabilizer

The PRR played a central role in maintaining financial stability. Across the study period, PRR remained relatively strong, fluctuating between approximately 4.2 and 4.8, though it trended downward after 2021. This indicated that universities had sufficient liquidity to meet short-term obligations and absorb shocks, but their reserve positions were weakening over time. From a Resource Dependence Theory (RDT) perspective, liquidity reserves are slack resources that organizations accumulate to buffer against environmental uncertainty (Pfeffer & Salancik, 1978). The Kenyan case reflected this dynamic, with universities relying on accumulated reserves to maintain operations amid declining revenues. However, the declining PRR suggested that these buffers were being systematically depleted, indicating that current stability was not self-sustaining. This finding aligns with international evidence showing that universities increasingly relied on reserves to manage financial stress (KPMG, 2021; NACUBO, 2022). Therefore, PRR served as a short-term stabilizer but a long-term warning signal, highlighting the fragility underlying apparent stability.

4.3.3 Net Operating Revenue Ratio (NORR): Persistent Structural Deficits

The NORR provided the clearest indication of the sector's financial weakness. The ratio remained negative throughout the study period, indicating that universities consistently operated at a deficit. Deficits were particularly severe in 2021 and 2023, reflecting periods of heightened financial stress. The NORR was a direct measure of operational sustainability, and its persistent negativity implied that institutions were unable to generate sufficient revenue to cover their expenses. As a result, they relied on reserves (PRR) or external support to sustain operations. This structural imbalance was the primary driver of declining liquidity and, consequently, the downward trend in CFI. The findings were consistent with global trends in higher education finance, where institutions face increasing difficulty in balancing revenues and expenditures (OECD, 2023). From an RDT perspective, the negative NORR reflected dependence on constrained funding sources, particularly

government allocations and tuition fees, which are often insufficient and unpredictable (World Bank, 2022).

4.3.4 Return on Net Assets (RONA): Declining Asset Productivity

The RONA trend highlighted the efficiency dimension of financial performance. The ratio peaked in 2019, coinciding with the highest CFI, then declined steadily and turned negative by 2023–2024. This indicated that universities were increasingly unable to generate returns on their asset base. The decline in RONA suggested inefficient use of resources, including physical infrastructure and intellectual capital. From the perspective of the Knowledge-Based Theory, universities are expected to convert knowledge and assets into economic value through research commercialization, industry partnerships, and innovation (Clark, 2020; Marginson & Considine, 2020). The observed decline indicated that this transformation was not occurring effectively. Literature supports this interpretation, emphasizing that financial sustainability depends on the productivity of institutional assets, not merely on revenue levels (Hearn, 2021). Thus, declining RONA represents a structural inefficiency that undermines financial stability.

4.3.5 Viability Ratio (VR): Limited Role of Debt Financing

The Viability Ratio showed that only one university (JKUAT) carried long-term debt, while all others operated without debt. This indicated a conservative financial structure with minimal reliance on external financing. While the absence of debt reduced financial risk, it also limited capacity for strategic investment and expansion. From an Agency Theory and Resource Mobilization perspective, access to financial capital is essential for growth and innovation (Jensen & Meckling, 1976). The lack of debt financing suggests that the universities may be constrained in their ability to invest in income-generating assets, thereby reinforcing the limitations observed in RONA and NORR. Thus, VR had minimal direct contribution to CFI at the sector level but carried important structural implications for long-term sustainability.

4.3.6 Integrated Financial Dynamics: A System Sustained by Liquidity

The integration of all components reveals a coherent financial system marked by competing forces: PRR provides stability through liquidity buffers, NORR exerts downward pressure through persistent deficits, RONA influences stability through asset efficiency, and VA plays a negligible role due to limited debt financing. This interaction can be conceptualized as a financial sustainability model in which liquidity compensates for operational and efficiency weaknesses. However, this compensation is temporary, as continued deficits deplete reserves. Negative NORR → depletion of PRR → reduced financial flexibility → declining RONA → lower CFI. This dynamic explains why the sector remains stable in the short term but shows a clear downward trajectory in financial performance.

4.3.7 Theoretical Synthesis

The findings supported an integrated theoretical framework combining Resource Dependence Theory, which explains vulnerability due to reliance on external funding; Portfolio Theory, which highlights the importance of diversification, though not yet fully effective; and Knowledge-Based Theory, which emphasizes the role of asset productivity, which is declining. Together, these theories provided a comprehensive explanation of the observed financial dynamics, demonstrating that financial stability was shaped by the interaction of liquidity, performance, efficiency, and capital structure.

5. Conclusions and Recommendations

5.1 Conclusions

5.1.1 CFI and its components

A synthesis of results from the Composite Financial Index (CFI), Primary Reserve Ratio (PRR), Net Operating Revenue Ratio (NORR), Return on Net Assets (RONA), and the Viability Ratio (VA) provides a coherent, mechanism-based account of financial sustainability in Kenyan public universities. Taken together, the figures reveal a structured financial system in which financial stability was maintained by liquidity buffers, while operating deficits and declining asset productivity exerted persistent downward pressure. The results indicate a sector that appeared stable in aggregate but is increasingly fragile beneath the surface. Financial stability in Kenyan public universities was not driven by operational strength but by liquidity buffers that compensated for structural inefficiencies. First, the 2019 CFI peak was not sustained, indicating that the conditions that produced it were transitory. Second, the post-2019 decline was systematic rather than episodic, suggesting structural pressures rather than isolated shocks. Figure 5's annotations indicate that the sector spent most of the period below the optimal zone (CFI 5.0–6.0) and trended toward the lower bound of stability. To understand which combination of liquidity, operating performance, efficiency, and capital structure produced a persistently positive yet deteriorating CFI, it was necessary to decompose the CFI's drivers.

The decomposition shown in Figure 5 integrates these components and shows that CFI is the result of competing forces: PRR (liquidity) had a strong positive contribution; NORR (operating performance) had a strong negative contribution; RONA (asset efficiency) had a positive early contribution, then declined to negative; and VR (capital structure) had a negligible impact at the sector level. Empirically, therefore, PRR dominated the level, while NORR dominated the direction, and RONA explained turning points (notably the 2019 peak). VR played a minor role. The main inference was that the sector's financial stability (CFI ≈ 4–5) was not the result of healthy operations but was sustained by liquidity buffers that were gradually being depleted.

5.1.2 Primary Reserve Ratio

The analysis of the Primary Reserve Ratio (PRR) showed that, although Kenyan public universities maintained adequate liquidity on average, expendable reserves declined steadily over the study period. This trend reflected mounting financial pressure and underscored the fragility of institutional liquidity positions. The PRR was the primary stabilizer of CFI, providing the liquidity buffers that kept aggregate CFI above distress levels despite persistent deficits. Furthermore, the steady erosion of PRR over time signaled that stability was being financed by reserve drawdown rather than by improved operational performance. In other words, the system as a whole was consuming its buffer to maintain stability. This point is even more pronounced given the observed institutional heterogeneity. A cluster of universities maintained robust liquidity, with PRR ≈5.0–5.5, while a vulnerable subset (e.g., TUK, MMU, UOE) operated with low or deteriorating PRR, and EU exhibited negative reserves in later years. The positive aggregate CFI findings thus masked a bifurcated sector, where financial stability at the aggregate level coexists with fragility at the component level.

5.1.3 Net Operating Revenue Ratio

The observed NORR was negative in all years studied, with deep deficits in 2021 (~−0.45) and 2023 (−0.40), and only a near-break-even year in 2020 (~−0.08). This ratio provided the clearest evidence that the sector was not self-sustaining. Persistent deficits implied a drawdown of reserves (PRR), which reduced the liquidity buffer and, in turn, led to declining CFI resilience. The timing aligned with the CFI trajectory. The sharp NORR deterioration in 2021 coincided with the CFI drop from its earlier plateau, while the renewed deficit in 2023 corresponded to the CFI low point. NORR was therefore the primary negative driver of the CFI for the whole sector.

5.1.4 Return on Net Assets Ratio

The RONA, an indicator of asset efficiency, peaked in 2019 (~1.2), then declined sharply to near zero in 2021 (~0.1), recovered modestly in 2022 (~0.3), and turned negative in 2023–2024. The coincidence of high RONA and peak CFI in 2019 suggested that strong asset returns were central to that year's performance. As RONA fell, the sector lost a key engine of internal value creation, making it harder to offset operating deficits. By 2023–2024, a negative RONA indicated that assets were not generating adequate returns and may have been underutilized or misallocated. This reduced direct contributions to CFI and limited the capacity to rebuild PRR, as fewer surpluses were available to replenish reserves.

5.1.5 Viability Ratio

The VR was informative precisely because of its limited applicability. Only JKUAT carried long-term debt, while all other universities reported none, implying a zero-debt sector model. At the aggregate level, VR contributed negligibly to CFI. However, its structural implication is significant because the sector, as a whole, relies almost entirely on government funding and internally

generated income, with little leverage to finance growth or income-generating assets. This reduced exposure to interest and refinancing risk but also constrained investment capacity, especially for projects that could improve RONA and NORR.

Based on this study's empirical findings, Kenyan public universities were liquid but not self-sustaining, stable in the short term but fragile in the long term. The PRR buffer prevented a slide into financial distress during the study period, but it was progressively eroded by persistent operating deficits (NORR) and declining asset productivity (RONA). The absence of strategic leverage (VR) limited the capacity to invest in solutions that could reverse these trends. Unless the system shifts from buffer-dependent stability to operationally driven sustainability, the trajectory suggests continued erosion of financial resilience. The sector's positive financial condition was real, but it was financed by the depletion of reserves rather than by performance.

In conclusion, by integrating several indicators, namely the CFI, PRR, NORR, RONA, and VR, the study moved beyond descriptive trends to uncover the underlying financial structure, causal mechanisms, and sustainability dynamics shaping Kenyan public universities. The CFI component analysis showed that Kenyan public universities were financially stable but structurally fragile. Stability was sustained by liquidity buffers, while persistent deficits and declining asset productivity undermined long-term sustainability. This finding contributes to the literature by showing that financial stability must be understood as a dynamic, multidimensional construct rather than a static condition. The sector as a whole faces a critical challenge in transitioning from liquidity-driven stability to operationally sustainable financial performance. Without this transition, the continued erosion of reserves and efficiency will eventually lead to financial distress, despite current appearances of stability.

5.2 **Recommendations**

Based on the analysis of the CFI and its component ratios, the following actions are recommended at the policy and managerial levels:

Restore Operating Balance by fixing the NORR as the top priority. This can be achieved by aligning expenditures with realistic revenue projections, tightening cost controls, especially for recurrent costs, and improving billing, collections, and revenue assurance mechanisms.

Rebuild and Protect Liquidity (PRR) by establishing favorable reserve-retention policies and minimum liquidity targets, channeling a share of surpluses (when achieved) to replenish reserves, and avoiding the use of reserves to cover recurrent deficits except under strict rules.

Revitalize Asset Productivity (RONA) by accelerating the commercialization of research, IP, and consulting; optimizing asset utilization (e.g., facilities, land, and services); and applying investment discipline when screening projects for return on investment and risk.

Enable strategic debt financing (VR) by using prudent, project-based borrowing for income-generating assets, strengthening governance to ensure returns exceed the cost of capital, and developing a framework for beneficial public–private partnerships

Reform the Policy Environment by improving the predictability and timeliness of public funding, allowing flexibility in pricing (tuition and services) within accountability frameworks, and removing barriers to commercializing activities and partnerships.

5.3 **Contributions to Knowledge**

This study contributes to the discourse on higher education finance by demonstrating component-level divergences and variations in the CFI measure. It further makes an empirical contribution by providing a panel data analysis of the CFI and its component ratios in an emerging economy such as Kenya, whereas most applications have been in developed economies. Methodologically, the study moves beyond the aggregate CFI to its structural components and offers targeted diagnostics. Finally, the study makes policy contributions by advocating targeted institutional interventions, informed by the findings, to improve the financial situation of Kenyan public universities.

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