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Irene Ndumia, Job Omagwa, PhD & Daniel Makori, PhD

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^{*1}Irene Ndumia, ²Job Omagwa, PhD & ³Daniel Makori, PhD

¹Doctoral Student, School of Business, Economics and Tourism, Kenyatta University

*E-mail of corresponding author: irenendumia2@gmail.com

^{2,3}School of Business, Economics and Tourism, Kenyatta University

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Abstract

Listed firms play an integral role in economic growth by promoting industrialization, creating jobs, and enhancing value addition through raw material processing. These firms contribute to national output, export growth and supply chain development. However, over the last decade, majority of these firms have experienced declining efficiency with a decline in average ROA and over 40% of firms issuing profit warnings between 2015 and 2020, operational cost ratios persistently ranging between 68% and 85%, and multiple firm delisting during 2016–2023 linked to sustained underperformance. This study therefore sought determine the effect of intangible assets on efficiency of firms listed on NSE, Kenya. The study was underpinned by Tobin’s Q theory and Trade-Off Theory. Positivist philosophy and explanatory research design informed the study. The target population included all the 66 firms listed on NSE over the study time scope 2013-2024. This study adopted a census approach targeting the 66 firms listed on NSE and used panel data with listed firms at the Nairobi Securities Exchange serving as the unit of analysis. Data analysis was carried out using a combination of descriptive measures, bivariate correlation tests and econometric panel regression models. The findings the study found out that human capital return on investment ($\beta = 0.153309$, $p = 0.004$) had positive and significant effect on efficiency. The study however found that intangible asset ratio ($\beta = -0.06422$, $p = 0.042$) and had negative and significant effect on efficiency. The study thus recommends that, firms should manage intangible assets with greater strategic discipline. In addition, since intangible-heavy asset structures do not automatically translate into improved efficiency, managers should ensure that intangible investments are fully integrated into operational systems.

Keywords: *Intangible Assets, Firm Efficiency, Human Capital Return on Investment, Intangible Asset to Total Assets Ratio, Nairobi Securities Exchange.*

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1.0 Introduction

Listed firms significantly contribute to national output, export growth, and supply chain development (Bahodurov, Khoshimov & Alsaoub, 2025). Given their influence on economic stability, maintaining efficiency is vital for their long-term sustainability (Yang, Wang, Dong, & Cheng, 2024). Recent studies have increasingly focused on efficiency, attracting interest from scholars, industry professionals, and policymakers who seek to understand factors influencing firm performance (Supsermpol, Thajchayapong & Chiadamrong, 2023; Sarfraz *et al.*, 2023). Publicly traded firms, in particular, are under constant scrutiny and must optimize efficiency to meet stakeholder expectations. This need has intensified in response to global challenges such as political instability, technological change, and economic disruptions, which demand greater resilience and adaptability (Alabdullah, 2023; Udoy *et al.*, 2023).

Efficiency describes a firm's ability to maximize output while reducing input costs, ensuring that resources such as labor, capital, and technology are effectively used (Eneh, Anaage & Anyahara, 2024; Liu & He, 2024; Jiang & Li, 2024). It is an integral measure of a company's performance, directly influencing profitability, sustainability, and competitiveness. According to Odumbo and Nimma (2025), highly efficient firms are characterized by smooth production operations, minimal resource wastage, effective supply chain coordination, and improved output levels. Efficiency is largely influenced by factors such as advancements in technology, adoption of automation, prudent cost control, refinement of internal processes, and strategic use of employee expertise. Efficient firms consistently improve workflow, make use of data-driven decision-making, and adopt best industry practices to remain competitive in ever changing markets (Arora, Ahmad, Kumar & Singh, 2025).

Despite their vital role in Kenya's economy, most of the listed firms on NSE have been experiencing a decline in efficiency (Wandabusi, Ombok & Nyamita, 2023; Tanui & Serebemuom, 2021). This downturn has been attributed to a myriad of factors such as political instability, regulatory hurdles, and macroeconomic challenges including high inflation rates and currency devaluation (International Monetary Fund, 2020). The high cost of doing business, including utility costs and taxes, also hampers profitability. Additionally, these firms are often exposed to increased competition, both from local enterprises and international companies making inroads into the Kenyan market. A study by Njoroge (2019) highlighted that listed firms in Kenya struggle with operational inefficiencies and governance issues, which further affect their financial metrics negatively. Efficiency can be determined by cost management effectiveness, resource utilization rate, and process cycle time.

The Kenyan government, together with private sector firms and individuals in the private sector, has been making efforts to create a business-friendly environment in the country. As a result, many firms listed on NSE have seen improved performance over the past decade (NSE, 2022), while others have faced declines, and some have even been delisted from NSE over the same period. Major efforts to revive or liquidate these struggling companies have primarily centered on asset restructuring. Yet, there remains a lack of comprehensive guidelines for managers to make optimal decisions with regards to asset structure (Kibet *et al.*, 2021). Despite the challenges faced by companies under statutory management leading to loss of stakeholder wealth and diminishing investor confidence in the NSE, most of these issues have been broadly linked to asset structure (Chebii, Kipchumba and Wasike, 2019). Based on the above studies, contextual gaps are evident when comparing prior studies with the present research focus. It is evident that most global and regional studies have concentrated on board diversity, remuneration, and governance in shaping

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operational outcomes, but little has been done on the direct influence of asset structure on firm efficiency. Despite their vital role in Kenya's economy, most of the listed firms on NSE have been experiencing a decline in efficiency (Wandabusi, Ombok & Nyamita, 2023; Tanui & Serebemuom, 2021).

1.1 Research Problem

The stock markets, including the Nairobi Securities Exchange, are key in advancing national development by mobilizing capital and supporting the growth of Kenya's industrial and financial sectors (World Bank, 2024). Despite this strategic role, limited attention has been given to how the asset structure of NSE-listed firms influences their efficiency, thereby creating a key research gap. NSE-listed firms remain important drivers of Kenya's economy, with a combined market capitalization exceeding Ksh 2.1 trillion and representing more than 50% of the country's total market value as of 2025 (NSE, 2025). These firms operate across major sectors such as manufacturing, finance, energy, and agriculture, making them central to employment creation, economic growth, and regional competitiveness (NSE, 2025). In 2024, the NSE All-Share Index increased by 41.9%, while market capitalization grew by over Ksh 800 billion, indicating improved investor confidence.

Kenya's economy registered broad-based growth in 2024 with sectors represented on the Nairobi Securities Exchange including finance, energy, agriculture, services, and manufacturing acting as key drivers (KNBS, 2025). The NSE currently lists over 60 firms across these sectors, whose collective market capitalization exceeded Ksh 2.1 trillion in 2025, depicting their significance in mobilizing savings, creating employment, and enhancing regional competitiveness (NSE, 2025). Even though listed firms contribute significantly to GDP growth, export earnings, and technological development, existing statistics points to a declining and unstable efficiency trajectory among listed firms in Kenya. According to NSE (2020), the average return on assets (ROA) for listed non-financial firms declined from 8.6% in 2013 to below 4.5% by 2019, reflecting weakening asset utilization efficiency. Over the same period, cost-to-income ratios for several manufacturing and commercial firms rose above 70%, signaling reduced operational efficiency (NSE, 2020). More than 40% of listed firms issued at least one profit warning between 2015 and 2020, with many reporting sharp year-on-year fluctuations in operating margins and earnings per share.

Over the years fluctuating trends mainly for efficiency have been documented amongst firms listed on NSE. In the year 2016, eighteen of these firms issued profit warning out of the sixty-seven firms listed at the NSE by then, with some still facing serious financial distress. Most of the listed firms at NSE issued profit warnings during the period between year 2016 and 2020 (NSE, 2021). Between year 2013 and 2017, the proportion of profit warnings issued by commercial and services firms listed at the NSE varied significantly. In year 2013, these firms accounted for 43 percent of all profit warnings. The figure increased to 55 percent in year 2014, indicating a rise in financial performance concerns within the sector. In year 2015, the percentage dropped to 39 percent, suggesting a temporary improvement. This downward trend continued into year 2016, when only 18 percent of profit warnings came from commercial and services firms. However, in year 2017, the proportion rose again to 25 percent, reflecting a partial reversal in the previous year's decline (CMA, 2018). Existing studies have presented mixed and sometimes conflicting findings on the drivers of efficiency, revealing clear gaps. These gaps justify the present study, which examined the effect of intangible assets on efficiency among firms listed on the Nairobi Securities Exchange, Kenya.

1.2 Research Objective

To establish the effect of intangible assets on efficiency of firms listed on Nairobi Securities Exchange, Kenya.

1.3 Research Hypothesis

H₀: Intangible assets have no significant effect on efficiency of firms listed on Nairobi Securities Exchange, Kenya.

1.4 Value of the Study

The study is expected to be of great importance to a range of stakeholders. From a policy perspective, the study will provide evidence-based insights to regulatory bodies such as CMA and CBK, enabling them to formulate regulations that encourage balanced asset structuring among listed firms while safeguarding market stability and investor interests. The findings will support the development of more targeted frameworks aimed at improving corporate transparency, governance, and financial resilience within Kenya’s capital markets. From a theoretical perspective, this study will add to the existing body of knowledge in corporate finance by offering empirical evidence on how asset structure influences efficiency in emerging markets, with a specific focus on the Kenyan context. To practice, the study will offer corporate managers clear guidance on how different asset structures influence efficiency, assisting them in making informed strategic decisions related to resource allocation, risk management, and operational optimization. Investors will also benefit by gaining a deeper understanding of how asset composition affects firm performance, which can guide investment choices and portfolio management.

1.5 Scope of the Study

This study examined the effect of intangible assets on the efficiency of firms listed on the Nairobi Securities Exchange (NSE). This study geographically concentrated on enterprises listed on the NSE, utilizing secondary data mostly obtained from financial reports and NSE websites. The study was conducted covering a period of 12 years, from 2013 to 2024, offering a comprehensive perspective on trends and effects. The 2013–2024 timeframe was warranted since it encompasses a whole economic cycle, legislative modifications, and industry developments influencing asset composition and operational efficiency among companies listed on the NSE.

2.1 Literature Review

This study was underpinned by Tobin’s Q Theory and Trade-Off Theory.

2.2 Theoretical Framework

2.2.1 Tobin’s Q Theory

Tobin’s Q theory was developed by Tobin (1969). The theory states that the ratio of the market value of a firm’s assets to their replacement cost (Q ratio) serves as a guide for investment decisions. A Q greater than one signals that the market values assets more than their cost of replacement, encouraging firms to invest in new assets, while a Q less than one discourages further investment since the market undervalues the firm’s assets (Tobin, 1969). For firms listed on the Nairobi Securities Exchange (NSE), this framework underscores that asset efficiency is tied to how well current assets, intangibles, property, and long-term investments are deployed in ways that enhance market valuation relative to replacement cost (Chung & Pruitt, 1994). Firms that underutilize their fixed assets risk depressing their Q ratio, thereby signaling inefficiency to

investors. Thus, Tobin's Q highlights the necessity of aligning PPE investment with operational effectiveness and shareholder value creation (Lewellen & Badrinath, 1997). Tobin's Q theory relates to long-term investments and the moderating role of corporate governance in asset structure decisions. Long-term investments, when carefully aligned with market expectations, can elevate a firm's Q ratio by signaling growth and profitability prospects. This theory supports that efficiency arises not only from asset allocation but also from institutional structures that safeguard shareholder interests.

2.2.2 Trade-Off Theory

A theory of capital structure known as the Trade-Off Theory was created by Kraus and Litzenberger in 1973. According to this theory, businesses attempt to maximise their efficiency by striking a balance between the advantages of asset allocations and the costs that are associated with such allocations (Kraus & Litzenberger, 1973). The theory suggests that maintaining liquidity through cash, receivables, and inventories reduces financial distress risk, but excessive holdings may reduce profitability due to idle resources (Myers, 1984). Listed firms faces the challenge of finding this balance to maximize efficiency, as too much working capital locks resources that could otherwise generate returns (Jensen, 1986). Almeida, Campello, and Weisbach (2004) noted that firms with well-managed current assets can finance operations internally, reducing reliance on costly external capital. Similarly, Opler, Pinkowitz, Stulz, and Williamson (1999) demonstrated that cash holdings improve resilience during downturns but become inefficient if they remain underutilized. Intangibles, such as intellectual property, brand value, and goodwill, may enhance growth and efficiency but pose valuation and collateralization challenges in capital markets (Lev, 2001). According to Bharadwaj, Bharadwaj and Konsynski (1999), intangible assets can increase firm productivity if effectively leveraged, though they often carry higher uncertainty in generating tangible returns (Hand & Lev, 2003). Thus, for NSE-listed firms, Trade-Off Theory explains how balancing investments in intangibles with the costs of risk and valuation uncertainty affects operational outcomes (Lev & Zarowin, 1999).

2.3 Empirical Review

In their study, Ferdaous and Rahman (2019) investigated the connection between intangible assets and the performance of 49 manufacturing companies that were listed on the Dhaka Stock Exchange (DSE) in Bangladesh between the years 2007 and 2017. These companies were involved in four different industries. Both the Resource-Based View (RBV) and the Knowledge-Based View (KBV) served as the foundation for this research project, which placed an emphasis on the strategic role that intangible assets play in boosting the competitiveness of businesses. Despite the fact that intangible assets greatly boost earnings per share (EPS), businesses in Bangladesh struggle to maximize shareholder wealth due to weak stock market performance. The data revealed mixed behavioral impacts, which indicated that this is the case. On the other hand, the research was only concerned with intangible assets and financial performance, which means that there is a lack of knowledge on the ways in which other asset components, such as current assets, property, plant, and equipment, as well as long-term investments, influence efficiency.

In Brazil, Jibril, Kaltenbrunner and Kesidou (2025) examined the relationship between financialization and intangible assets in emerging market economies, focusing on publicly listed manufacturing firms from 2011 to 2016. The study challenged the traditional notion that a growing financial sector positively contributes to economic growth, highlighting how changes in financial structures can negatively impact non-financial corporations (NFCs). The study identified three key

channels through which finance influences intangible asset investment. Empirical findings confirmed that financialization negatively affects intangible assets through the crowding-out channel, where firms increase financial asset holdings at the expense of intangible investment. However, the study focused solely on intangible assets and financialization, creating conceptual gap. Moreover, the study was limited to Brazilian manufacturing firms, creating a contextual gap regarding the impact of asset structure on efficiency in other economies.

In a separate study, Sahoo, Swain and Das (2022) examined the influence of intangible assets on efficiency and market value among 27 IT firms listed on the NSE-500 over a 10-year period (2012–2022). The study employed panel data techniques, applying pooled OLS, fixed effects, and random-effects models to analyze the impact of intangible assets. The findings indicated that intangible assets significantly influenced both efficiency and market value, demonstrating their strategic importance in IT firms. However, the study focused exclusively on IT firms, presenting a sectoral gap regarding the effect of intangible assets on efficiency in other industries, such as manufacturing. Previous studies also failed to account for the impact of present assets, property, plant, and equipment, as well as long-term investments, on efficiency, which led to theoretical and practical voids. Through investigating the effects of tangible and intangible assets, property, plant, and equipment, and long-term investments on the productivity of Kenyan companies listed on the Nairobi Securities Exchange, this study aims to close these knowledge gaps.

Raza (2023) on impact of intangible assets on cash flows and efficiency found out that intangible assets positively impact operating cash flows, suggesting that firms benefit financially from investing in intangible resources. However, intangible assets had a negative effect on efficiency, indicating that while these assets improve liquidity, they may also introduce inefficiencies in business processes. There is however conceptual gap in our understanding of the contributions of current assets, property, plant, and equipment, as well as long-term investments to efficiency, as the study solely examined the relationship between intangible assets, cash flows, and efficiency. The study also didn't account for how asset structure affects efficiency in other economies or industries because it only looked at non-financial enterprises listed on the PSX. Companies traded on Kenya's Nairobi Securities Exchange have their present and future asset, intangible asset, property, plant, and equipment (PPE) and investment (LTI) valuations examined.

2.4 Conceptual Framework

In this study, the dependent variable is the efficiency of firms listed on the Nairobi Securities Exchange, Kenya, which is influenced by intangible assets. The conceptual framework is as shown in Figure 1.

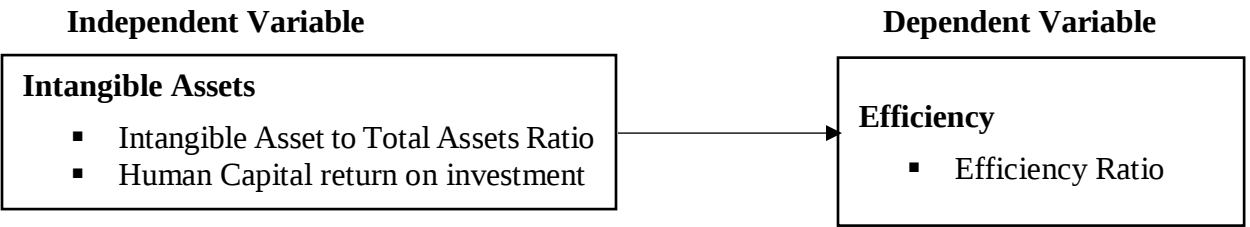


Figure 1: Conceptual Framework

Source: Researcher (2025)

3.0 Methodology

3.1 Design and Philosophy

The study adopted a positivist research philosophy and an explanatory research design to examine the effect of intangible assets on the efficiency of firms listed on the Nairobi Securities Exchange. Positivism was appropriate because the study relied on observable, measurable, and quantifiable financial data, allowing hypotheses to be tested objectively through statistical methods (Mkansi & Acheampong, 2012; Creswell & Creswell, 2018). The explanatory design was suitable because the study sought to establish causal relationships between intangible assets and firm efficiency, while supporting the use of regression analysis, panel data techniques, and moderation testing in finance and management research (Toyon, 2021; Makri & Neely, 2021; Hair et al., 2022; Saunders, Lewis & Thornhill, 2023).

3.2 Target Population

The study targeted all 66 firms listed on the Nairobi Securities Exchange for the period 2013 to 2024, with each firm serving as the unit of analysis (NSE, 2025). A census approach was used because the population was manageable and helped eliminate sampling error (Kothari & Garg, 2022; Banerjee & Pradhan, 2024).

3.3 Data Collection and Analysis

Secondary panel data were collected from audited annual financial statements, company websites, NSE records, and other credible sources using a structured data extraction tool. Data were analyzed using descriptive statistics, Pearson correlation, and panel regression with the support of STATA version 24.0 (Dimić et al., 2019; Chen et al., 2018; Wooldridge, 2013; Brooks, 2008; Timoneda, 2021). Since some firms could have incomplete records, the study adopted an unbalanced panel regression model to retain all available firm-level observations across the study period (Baltagi, 2005; Wooldridge, 2010; Hsiao, 2014). The study adopted the following panel regression model

$$E_{it} = \alpha + \beta IATA_{it} + HCRI_{it} + \varepsilon_{it}$$

Where:

E_{it} = Efficiency of firm i at time t .

α = Constant term.

$IATA_{it}$ = Intangible Asset to Total Assets Ratio of firm i at time t .

$HCRI_{it}$ = Human Capital Return on Investment of firm i at time t .

β = Coefficients of the explanatory variable.

ε_{it} = Error term.

Before panel regression analysis was conducted, diagnostic tests were conducted for normality using the Jarque–Bera test, heteroscedasticity using the Breusch–Pagan test, autocorrelation using the Durbin–Watson test, stationarity using the Levin–Lin–Chu unit root test, and model specification using the Hausman test. Ethical clearance was obtained from Kenyatta University Graduate School and NACOSTI, while all data were handled confidentially and used only for academic purposes (Saunders et al., 2009).

4.0 Findings and Discussion

4.1 Descriptive Statistics

Using descriptive statistics the researcher was able to condense the features of the elements linked to intangible assets and efficiency. Table 1 provides a descriptive summary of the variables over a 12-year period (2013–2024), for all 66 companies listed on the Nairobi Securities Exchange.

Table 1: Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
ER	768	0.285409	0.815124	0.548317	0.15566119
IATAR	768	0.022773	0.078149	0.050282	0.016145173
HCROI	768	0.022233	0.071743	0.046102	0.014286908

ER = Efficiency Ratio, IATAR = Intangible Asset to Total Assets Ratio, HCROI = Human Capital Return on Investment

Source: Research Data, 2025

The descriptive results showed that the efficiency ratio had a mean of 0.548317, with a standard deviation of 0.15566119, indicating moderate variability in efficiency among firms listed on the Nairobi Securities Exchange between 2013 and 2024. The mean value suggested that firms converted slightly above half of their inputs into productive output, reflecting moderate operational efficiency. The intangible asset to total assets ratio had a mean of 0.050282 and a standard deviation of 0.016145173, with values ranging from 0.022773 to 0.078149. This indicated that intangible assets formed a small but relatively stable component of total assets among listed firms, suggesting possible underinvestment in intangible resources. These findings differed from Raza (2023), who found that intangible assets positively affected cash flows but negatively influenced efficiency. Human capital return on investment recorded a mean of 0.046102 and a standard deviation of 0.014286908, with values ranging from 0.022233 to 0.071743. This showed that firms generally realized positive returns from staff-related investments, although the variation indicated differences in human capital productivity across firms. The findings imply that firms with stronger human capital returns were likely to achieve better efficiency outcomes. This agrees with Ferdaous and Rahman (2019), who found that intangible resources such as human capital improved firm performance.

4.2 Trend Analysis

Trend analysis involves examining how variables change over time to identify patterns, directional trajectory, or structural changes that influence firm behaviour and performance.

4.2.1 Trend Line Analysis for Efficiency Ratio

Figure 2 shows trend analysis for efficiency ratio.

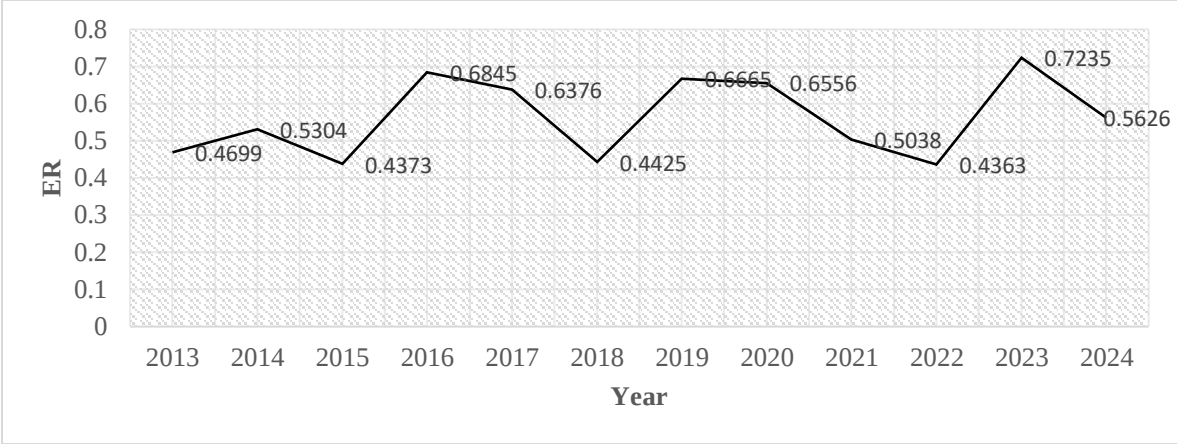


Figure 2: Trend Line for Efficiency Ratio

Source: Research Data, 2025

The trend results showed that efficiency among firms listed on the Nairobi Securities Exchange fluctuated between 2013 and 2024, with the ER rising from 0.4699 in 2013 to 0.5304 in 2014, before declining to 0.4373 in 2015, indicating inconsistent asset utilization. A strong improvement was recorded in 2016, where ER increased to 0.6845, followed by a relatively high level of 0.6376 in 2017, before falling sharply to 0.4425 in 2018. Efficiency then rebounded to 0.6665 in 2019 and remained strong at 0.6556 in 2020, suggesting resilience even during the COVID-19 period. However, ER declined to 0.5038 in 2021 and further to 0.4363 in 2022, reflecting renewed operational inefficiencies. The highest efficiency level was recorded in 2023 at 0.7235, suggesting exceptional asset utilization, before declining to 0.5626 in 2024, which still reflected moderate performance. The trend generally indicates that firm efficiency varied across the period, with major peaks in 2016, 2019, and 2023, showing that asset structure, market conditions, and strategic management decisions played a key role in shaping operational efficiency. The trend line demonstrates some level of year-to-year variations in firm efficiency, with peaks in 2016, 2019, and 2023.

4.2.2 Trend Line Analysis for Intangible Asset to Total Assets Ratio

Figure 3 illustrates the year-to-year pattern of the intangible asset to total assets ratio during the study period.

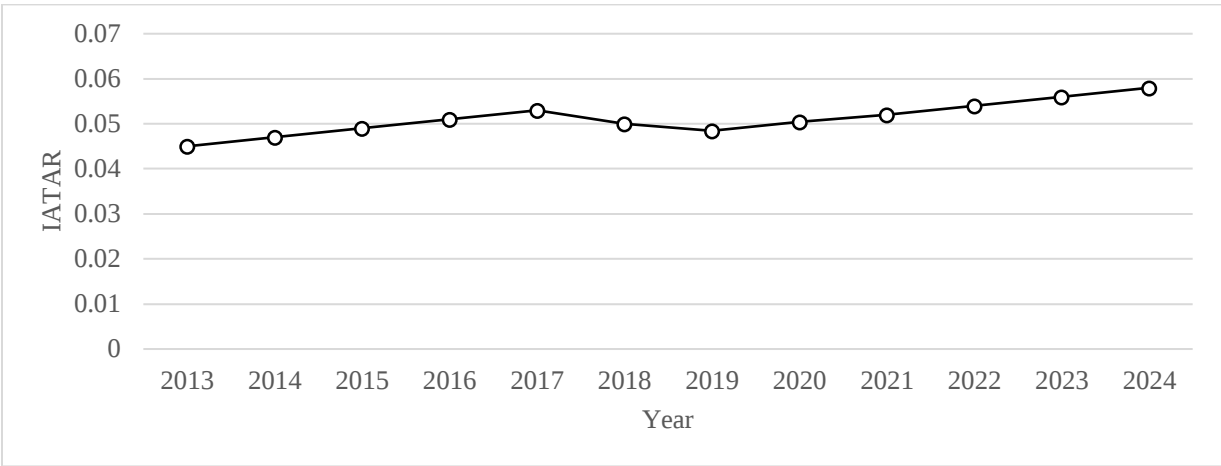


Figure 3: Trend Line for Intangible Asset to Total Assets Ratio

Source: Research Data, 2025

The trend in the intangible assets to total assets ratio show a gradual rise among firms listed on the Nairobi Securities Exchange between 2013 and 2024, indicating increasing reliance on intangible resources such as software, intellectual property, and brand value. The ratio increased steadily from 0.045 in 2013 to 0.053 in 2017, suggesting progressive investment in intangible assets. However, it dropped slightly to 0.050 in 2018 and 0.0485 in 2019, possibly reflecting temporary adjustments in asset composition or stronger expansion of tangible assets. A recovery was recorded in 2020, when the ratio rose to 0.0505, followed by 0.052 in 2021. From 2022 onward, the ratio increased consistently from 0.054 in 2022 to 0.056 in 2023 and 0.058 in 2024, showing that intangible assets were becoming more central to firm strategy. Overall, the 12-year trend reflected initial growth, a brief decline, recovery, and sustained growth, confirming the increasing importance of intangible assets in supporting operational efficiency and long-term value creation among NSE-listed firms.

4.2.3 Trend Line Analysis for Human Capital Return on Investment

Figure 4 illustrates the year-to-year changes in HCROI.

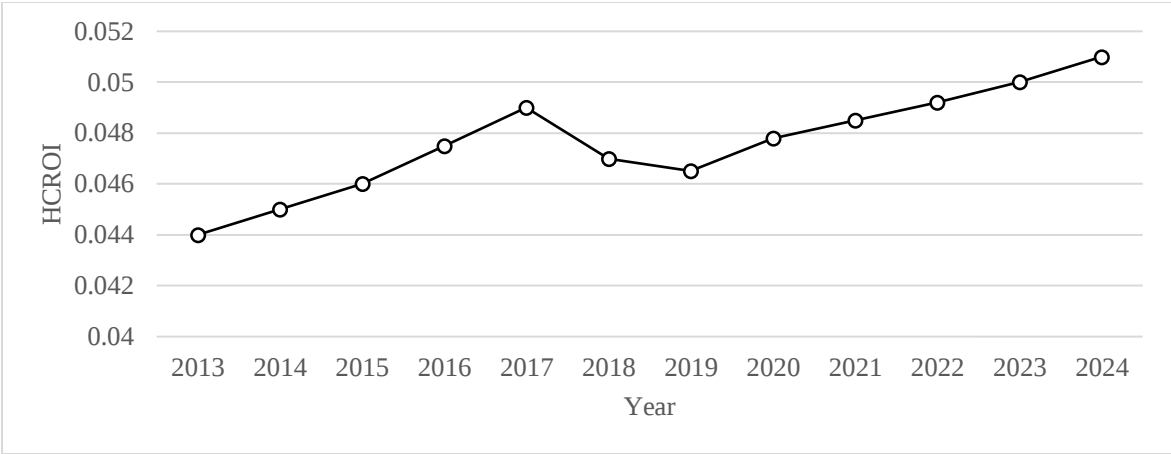


Figure 4: Trend Line for Human Capital Return on Investment
Source: Research Data, 2025

The Human Capital Return on Investment (HCROI) trend showed a generally upward movement among firms listed on the Nairobi Securities Exchange between 2013 and 2024, indicating improved efficiency in converting human capital expenditure into financial value. HCROI increased steadily from 0.044 in 2013 to 0.045 in 2014, 0.046 in 2015, 0.0475 in 2016, and 0.049 in 2017, showing consistent improvement in workforce productivity and better alignment of employee capabilities with operational goals. However, a slight decline was recorded in 2018 and 2019, where HCROI dropped to 0.047 and 0.0465, respectively, suggesting short-term disruptions linked to restructuring, cost pressures, or market challenges. The trend recovered from 2020, rising to 0.0478, then 0.0485 in 2021, 0.0492 in 2022, 0.050 in 2023, and reaching the highest level of 0.051 in 2024. Overall, the trend indicated that despite minor fluctuations, NSE-listed firms progressively improved their ability to convert human capital investments into financial outcomes, confirming that employee development, capability building, performance-based programs, and strategic workforce deployment were important drivers of firm efficiency.

4.3 Correlation Analysis

Correlation analysis was applied to determine how intangible asset ratio, human capital return on investment relate to firm efficiency among companies listed on the Nairobi Securities Exchange. This analytical approach is important because it provides preliminary evidence of potential relationships that may warrant further investigation through more advanced techniques like panel regression analysis. The correlation matrix for this study was generated at the 5 percent significance level using stata software, and the coefficients are presented together with their corresponding p-values in Table 2.

Table 2: Correlation Matrix

Variable	ER	IATAR	HCROI
ER	1.0000		
IATAR	−0.3472	1.0000	
HCROI	0.4685*	−0.3228	1.0000

ER = Efficiency Ratio, IATAR = Intangible Asset to Total Assets Ratio, HCROI = Human Capital Return on Investment

Source: Research Data, 2025

The results despite that intangible asset to total assets ratio (IATAR) shows a weak negative correlation ($r = -0.3472$), indicating that higher proportions of intangible assets do not necessarily translate into immediate efficiency gains. This complements the findings of Jibril, Kaltenbrunner, and Kesidou (2025), who reported that financialization may crowd out intangible investment, thereby weakening operational outcomes. Human capital return on investment (HCROI) exhibited a strong and significant positive relationship with ER ($r = 0.4685^*$), suggesting that firms generating higher financial returns from human capital investments tend to operate more efficiently. This corroborates the findings of a study by Alarussi (2021), who found that productivity-related ratios positively influence efficiency, though the study expands this evidence to human capital metrics specifically.

4.4 Panel Regression Analysis

Before fitting panel regression model, diagnostic tests were conducted to confirm the suitability of the data for regression analysis. The results showed no multicollinearity, since the VIF values ranged from 1.43 to 2.56, all below the threshold of 10. Normality was confirmed as all Jarque–Bera probability values were above 0.05, while the Breusch–Pagan test showed homoscedasticity, $\chi^2(1) = 0.4732$, $p = 0.4915$. The Durbin–Watson statistic of 1.982 indicated no autocorrelation, and the unit root results confirmed stationarity at level or after first differencing. The Hausman test result, $p = 0.8874$, supported the use of the random effects model for panel regression analysis.

This study determined how intangible assets influences the efficiency of firms listed on the Nairobi Securities Exchange. Panel regression techniques were employed to empirically assess the relationships under investigation. The findings revealed that intangible asset to total asset ratio (IATAR) had a negative and significant effect on efficiency ($\beta = -0.06422$, $p = 0.042$). This indicates that higher proportions of intangible assets are related to lower operational efficiency among NSE firms. Intangible investments, such as patents, software, or brand equity, often require long gestation periods before contributing to operational improvements. These results echo the findings of Jibril, Kaltenbrunner and Kesidou (2025), who found that financialization negatively affects intangible asset accumulation in Brazil, suggesting that firms often shift resources away from intangible-intensive activities. However, the study also showed that intangible assets play an important strategic role yet this strategic value does not immediately translate into short-term operational efficiency, which explains the negative coefficient found in this study.

Furthermore, the findings show that human capital return on investment (HCROI) revealed a positive and statistically significant effect on efficiency ($\beta = 0.153309$, $p = 0.004$). This implies that firms investing effectively in their workforce through training, compensation, and skill development tend to achieve higher efficiency outcomes. Human capital enhances organizational capability, stimulates innovation, and improves productivity. Consequently, the null hypothesis is rejected. The study thus found that firms that invest in personnel development, training, and performance-based human capital systems exhibit superior efficiency. These findings concurs with those of Masila (2024), who emphasized the role of intangible resources (such as human capital competencies) in improving firm performance.

5.0 Conclusion

Intangible assets such as patents, software, and brand investments had long-term strategic value, but their contribution to operational efficiency depended on how well they were integrated into firm systems. Although firms invested in intangible assets to improve innovation, competitiveness, and customer engagement, these investments did not automatically translate into short-term

efficiency gains. Therefore, firms needed to align intangible asset investment with operational processes, organizational capabilities, and performance systems to ensure that such assets produced measurable efficiency improvements rather than remaining static balance sheet items. The study also concluded that human capital investment was a key driver of firm efficiency because employee competence, innovation capacity, and performance-driven culture improved adaptability, reduced operational bottlenecks, and strengthened process execution. Firms that treated human capital as a productivity engine rather than a cost centre were better positioned to convert resources into output. In the NSE context, sustained investment in training, employee development, and performance management was necessary for maintaining competitiveness, especially in a changing technological and market environment.

6.0 Recommendations

Moreover, policies aimed at promoting internal capability development should also be prioritized. Since human capital investments significantly affected efficiency, policymakers should incentivize firms that invest in workforce development, innovation training, and productivity-oriented skill enhancement. Tax rebates for certified employee training programs, digital transformation initiatives, or advanced supply chain optimization tools would enable firms to improve asset utilization and operational performance. Such policies support national goals for industrial transformation by improving the human and technological foundations of firm-level efficiency. In addition, firms need to manage intangible assets with greater strategic discipline. Since intangible-heavy asset structures do not automatically translate into improved efficiency, managers should ensure that intangible investments are fully integrated into operational systems.

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