

Board Diversity and Efficiency of Universities Registered in Kenya: The Role of Funding Sources

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ABSTRACT

The board diversity of institutions plays an integral role in minimizing uncertainty, augmenting knowledge sharing, improving resource utilization, and crafting overall institutional strategy to enhance optimal efficiency. Institutions with more heterogeneous boards are characterized by their ability to attract finances from multiple sources; hence, they are better positioned to be more efficient in their operations. The main aim of this study was to assess the role of funding sources in the association between board diversity and the efficiency of universities registered in Kenya. The study was supported by the agency theory, the human capital theory, the stewardship theory, and the theory of pecking order. The positivist research paradigm anchored the study. A census study of 75 public and private universities in Kenya was conducted using a descriptive longitudinal research approach. The descriptive statistics included calculating the counts, standard deviation, mean, minimum and maximum values, coefficient of variation, kurtosis, and skewness. The fixed effect model was used as the primary estimation technique in inferential statistics. The results established that funding sources partially mediate the association between board diversity and efficiency. The study recommends that for universities to increase efficiency, the boards must make a greater effort to support board diversity, establish the dimensions within the board diversity relevant to efficiency enhancement, and establish multiple funding sources to remain afloat in their operations.

Keywords: Board diversity, efficiency, funding sources, universities registered in Kenya.

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1. INTRODUCTION

1.1. Background

Over the last two decades, there has been renewed and protracted attention globally on the role of board diversity in institutional efficiency. To enhance optimal efficiency, board diversity is integral in minimizing uncertainty, augmenting knowledge sharing, improving resource utilization and crafting overall institutional strategy. As Hillman and Dalziel (2003) suggested, board diversity enhances better or quality decision-making, leadership and improved innovative ideas, potentially influencing the choice of institutional funding sources. Organizations with diverse and reliable funding sources often have sufficient resources to undertake various functions, positively impacting overall organizational efficiency.

Ararat *et al.* (2015) define diversity as a situation in which the same opportunity is given to all categories

of people of different characteristics. Timmerman (2000) views it regarding demographics, including age, gender and non-observable characteristics. A diverse university board plays a significant role in attaining this anticipated efficiency as they cultivate the frameworks, identify control variables and influence the funding sources (Konrad *et al.*, 2016). To attain efficiency in universities, they are supposed to be governed by experienced and well-trained professionals in corporate policy and planning (Ararat *et al.*, 2015). It is expected that a diverse university council should uphold all stipulated principles relating to good governance to enhance the efficiency of universities and oversight of the university management instead of becoming accomplices in mismanagement (Galia & Zenou, 2013).

A funding source is the means of furnishing an institution with a regular source of income for its operation,

which can be done through government budget, contributions by the population, donations, sponsorships, self-generated incomes by educational institutions and various external sources, such as grants and loans granted by financial institutions (Maria & Bleotu, 2014). Salmi and Hauptman (2006) view funding sources as constituted by students' tuition fees, loans from commercial banks, organizations, research contracts and donations by philanthropists.

There is widespread financial instability and unsustainability in many universities in developed and transitioning countries (Mutiso et al., 2015). With limited funding sources and rising student enrollments, higher education funding must be carefully planned to maximize efficiency. Funding higher education is a means for allocating resources and a platform for facilitating interaction between funders and users. Over the years, the higher education funding share by the Kenyan government has declined relative to funding from private sources due to the development of higher education systems and austerity measures. Overall, government and per-student funding have fallen in real terms, a trend witnessed mainly in transitioning and developed economies (Mutiso et al., 2015). Funding sources in Kenyan universities include government capitation, student fees, other internally generated revenue, and grants and donations from development partners or partner institutions as categorized by CUE since they can easily be derived from the audited financial accounts of each university and expressed as proportion of each funding source to the total funds.

Efficiency is an optimal situation in a production process where the operational dynamics are such that there is an optimal output for a specified input capacity or nominal input for a specified output level (Barra & Zotti, 2013). Munoz (2016) categorizes efficiency in higher education into four key types: allocative efficiency, technical efficiency, overall efficiency and scale efficiency. This study was based on technical efficiency, identified as how efficiently an institution designates the physical inputs available to produce a specific output level, which implies the ability to generate the utmost possible production from a specific set of inputs. This study will adopt the view that entities using the least number of inputs per output were regarded as technically efficient relative to their peers.

The inputs/outputs selection for DEA is essential in determining the efficiency score. In the use of DEA, the resources are known as "inputs", while the outcomes are referred to as "outputs". In identifying a DMU's inputs and outputs, one should capture all the resources that affect the outputs. The outputs should reflect all the valuable outcomes we wish to assess the DMUs. According to McMillan and Datta (1998), selecting inputs and outputs should consider the DMU's specialization. The output and input measures should reflect a university's role, performance, and function, including community service, research and teaching. Hence, the choice of inputs, the number of academic personnel (teaching), expenditure (teaching and research), outputs, the number of graduates and web metric rankings (community service, research and teaching). Some of the studies that used the number of academic staff as input include those of Agasisti and

Johnes (2009), Avkiran (2001), and Wolszczak-Derlacz (2017), while those that use expenditure include those of Erkoç (2016), Kuah and Wong (2011) and Lee (2011). Regarding the selection of outputs, García-Aracil (2013) and Johnes (2013) used the number of graduands, while Myeki and Temoso (2019) and Yaisawarng and Ng (2014) used Webometric ranking. This research uses input/output variables directly related to the actual situation of the universities: the number of academic personnel, total expenditure, the total graduands, and the webometrics rankings of universities in Kenya.

In Kenya, the university boards are diverse in age, tenure, gender, expertise, and academic credentials, although these attributes vary from one institution to the other. Universities in Kenya are currently confronted by myriad systemic challenges emanating from different sources (CUE, 2021). The dynamic and fast growth of universities in Kenya in the last five years has put institutions of higher learning under siege occasioned by poor governance, a shortage of teaching staff, and limited facilities (Odhiambo, 2018; Zeleza, 2020). The universities in Kenya have shown significant inefficiencies attributable to reduced government funding, frequent student and lecturer strikes, and lack of curriculum standardization. The COVID-19 outbreak has negatively affected the overall performance of Kenyan universities by almost paralyzing the entire sector owing to declining student numbers, reduced state funding, delayed fee payment by students, and increased study deferrals. This has primarily affected the efficiency of universities in Kenya. Although most universities have diversified their financial base owing to reduced state funding, many institutions are greatly grappling with the challenge of maintaining a sufficient level of finance to support their operations on a day-to-day basis. Universities are fiercely competing to attract students who can afford to pay exorbitant fees. This has forced universities to overlook the mandatory quality regulatory measures as they shift focus to revenue-generating courses.

1.2. Problem Statement

Among Kenyan universities, some universities have demonstrated higher levels of efficiency in comparison to others. It is, therefore, essential to empirically investigate whether these disparities can be traced to board diversity and funding sources. Most universities are not operating at an optimal level of efficiency due to governance issues, lack of sufficient funds from internal and external sources, shortage of academic staff, and lack of innovative programs. Moreover, the COVID-19 pandemic has significantly reduced student enrolment, wiping out the revenues generated from self-sponsored programs. This has forced some universities to downsize, reduce the salaries of some staff, send some employees on leave, and restructure their governance structure, including programs, among other intervention measures, to survive. Regrettably, some institutions have been forced to delay remitting statutory deductions, loan remittances, and medical premiums. Though board diversity is theoretically linked with improved efficiency, the empirical literature, on the other hand, has been inconclusive owing to mixed findings ranging from positive and neutral to negative linkage.

The absence of convergence in the empirical literature is credited to conceptual, contextual, and methodological gaps. At a conceptual level, mixed findings can be attributed to the selection and operationalization of the study variables. There is no universal definition and indicators of board diversity, funding sources, and efficiency owing to the heterogeneity of metrics employed by prior empirical works. Some studies are bivariate, focusing only on board diversity and efficiency and signifying significant correlation (e.g., Adeabah *et al.*, 2019; Alfiero *et al.*, 2019; Ali *et al.*, 2021). In contrast, some studies have integrated moderators, contributing to contradictory outcomes (Coupet, 2017; Li & Chen, 2018; Selim & Bursalioglu, 2013). At the contextual level, mixed findings can be traced to sectorial disparities and variation between the developed and the developing markets based on regulatory, economic, political and cultural settings. A study by Nguta and Ndegwa (2021) was carried out in a SACCO context and established that the firm revenue did not serve as a mediator between board characteristics and financial stability, while a study that was undertaken by Coupet (2017) established that funding sources mediated the connection between board diversity and institutional efficiency in the United States. Scholars have varied views on the connections between board diversity and efficiency in a corporate setup; it is, however, puzzling to notice the limited work on this relationship within a university setup. At a methodological level, inconsistent findings can be attributed to the choice of econometric or estimation model, the type of data applied (cross-sectional/longitudinal), sampling differences, and varying study time frames. Since board diversity and efficiency relationship among universities in Kenya is largely understudied, the study investigated this linkage by incorporating funding sources as the mediator. Consistent with the research problem, this study addressed these gaps by offering an answer to the research question: What is the role of funding sources in the relation between the diversity of a board and the efficiency of universities registered in Kenya?

2. LITERATURE REVIEW

2.1. Theoretical Framework

The theories discussed hereunder are the agency, human capital, and pecking order theories. Jensen and Meckling (1976) propounded the agency theory (AT), which indicates that an agency relationship exists when an individual, the principal, hires an agent to perform specific duties on his behalf. Conflicts may arise between the agent and the principal during their operations. The agents may wish to award themselves a maximum compensation for their efforts; alternatively, if the compensation is certain, reduce their effort. Sometimes, agents may take too much risk to the discomfort of the principal. The principal would like to maximize the output from the agent and, at the same time, minimize the costs of hiring the agent. The disconnect of interests between two parties results in an agency conflict; agency clashes are frequently severe and most repeatedly done in public institutions. The principal-agent problem is often associated with larger firms, especially universities,

where the government, parents, and financiers own ownership. However, the university councils and vice-chancellors make most decisions (Jerzemowska, 2006).

In line with agency theory, board diversity leads to better executive monitoring, which leads to improved performance. Moreover, diversity brings a wealth of new ideas, experiences, points of view, and information, typically leading to better decision-making processes (Hillman, 2015). Despite the overwhelming support for diversity within the boards, an argument still exists that diversity can negatively affect firms. Agency theory points out that increased board diversity tends to inhibit the process of coming up with decisions, and this can influence performance in a negative way (Krishnan & Park, 2005). In addition, Increased diversity may result in a clash of opinions and ideas among board members, lowering firm performance (Lincoln & Adedoyin, 2012). To carry out its supervisory role, the board must have the prudent combination of knowledge and the ability to review corporate strategies (Hillman, 2015). Therefore, AT offers justification for the board's essential role of overseeing administration practices on behalf of the owners. However, there is inconsistency in explaining how board diversity affects decision-making and firm efficiency. From a corporate governance point of view, the management of public universities is monitored by university councils appointed by the government. In contrast, that of private universities shall be an individual or a duly registered or incorporated legal entity.

The human capital theory (HCT), propounded by Doeringer and Piore (1971), views formal education as instrumental and capable of improving a group's dynamic capacity, which then positively impacts efficiency in productivity. Human capital theorists believe in private support from students, parents and other shareholders because education is a private and government asset; they further argue that all it gains should finance education. Based on HTC, there is a connection between the financial resources spent on education provision and the efficiency of those institutions. Since stakeholders such as government, industry, and society benefit from education, they should be willing to pay for it to improve the efficiency of such institutions. However, a study by Mathenge and Muturi (2017) reveals that some universities continue to perform well with the bit of funding allocation they receive. Hence, poor performance may be related to limited funds and how such institutions are governed. Moreover, education, being a public good, may suffer from many free riders who may be unwilling to pay, negatively impacting such institutions' efficiency.

The pecking order theory (POT) postulates that firms select their funding sources guided by the cost of financing. Internal funds are supposed to be used first, and when that is exhausted, debt is raised, and when no more debt is possible, equity is issued. POT assumes the presence of an information gap between stockholders and management and that management has information about the firm's performance that external investors do not (Nirajini & Priya, 2013). To minimize the additional costs and drawbacks of asymmetric information, institutions should use external sources of financing in the following order:

debt financing first, preferred stock issuance second, and common stock issuance (Abosede, 2012). Managers of universities should set priorities when financing operations so that they first use internally generated funds. Then, if that funding source is exhausted, they turn to debt capital and, if allowed, equity financing. Pecking order theory assumes the existence of only the traditional methods of financing. Universities in Kenya have restricted sources of funds to finance their operations. Universities and other tertiary institutions are regulated by specific parliamentary acts that specify revenue sources, putting them at a disadvantage regarding revenue generation. Universities use the pecking order theory to some extent when making financial decisions. However, the policy that governs universities limits their ability to raise funds to meet their requirements for growth (Nirajini & Priya, 2013). As a result, according to the theory, there is a constructive linkage between the funding sources and university efficiency.

2.2. Conceptual Framework

This study’s independent and dependent variables are board diversity and efficiency, respectively. This is premised on the reality that a diverse university board plays a significant role in attaining efficiency. They cultivate the frameworks and identify control variables that can influence the funding sources (Konrad et al., 2016). The diversity of a board plays a key role in enhancing optimal efficiency and better corporate governance practices in an organization; this, in turn, fosters better decision-making and brings about innovation, improves information sharing, reduces uncertainty, and assists firms in resource management (Hillman & Dalziel, 2003). In this study, university board diversity comprises the educational level, gender, ethnicity and professional qualifications of university council members, hence incorporating both the directly observable and the less observable aspects expected to influence the efficiency of universities.

This study looked further into the role of dependent and independent variables. This was achieved by how the board diversity influences the funding sources and whether it reduces or increases the effect on efficiency, answering whether funding sources are products of board diversity. The funding sources for this study included government capitation, student fees, grants and donations from development partners or partner institutions, and other incomes

generated revenue based on the categorization by CUE since they can easily be derived from the audited financial accounts of each university or CUE data bank and expressed as a proportion of each funding source to the total funds. Depending on various skills, competencies and linkages among the board members who might raise funds from different sources and hence higher efficiency of universities. Hence, the funding source may make a university less or more efficient. The role of the intervening variable (funding sources) in the board diversity efficiency is shown in route H₁. This entire relationship is shown in the conceptual framework in Fig. 1.

From the conceptual model, the following null hypothesis was formulated and tested:

H₁: Funding sources do not significantly mediate the relationship between board diversity and the efficiency of universities registered in Kenya.

3. METHODOLOGY

3.1. Data

The study targeted all 75 Kenyan public and private universities, including the constituent university colleges, from 2013 to 2020. A census survey of all public and private universities registered by Kenya’s Commission of University Education (CUE) was used. Secondary data was collected from CUE data bank, official university websites and the audited annual reports and financial statements for public and private universities registered by CUE from 2013 to 2020. This study period is justified because it was during this period that CUE, through its Planning, Research and Development Division, could collect accurate data and information about universities in Kenya through a first-ever status report (CUE, 2021). Hence signifying the availability of accurate data during the period. Also, the same period that the Universities Act 2012 was established significantly impacted the governance of universities in Kenya. Most of the university councils of public universities in Kenya were appointed in 2013 under the new Universities Act 2012 to serve for an initial term of 4 years and one more term of 3 years. Therefore, to observe two cycles in a university council required a minimum of 7 years in the study.

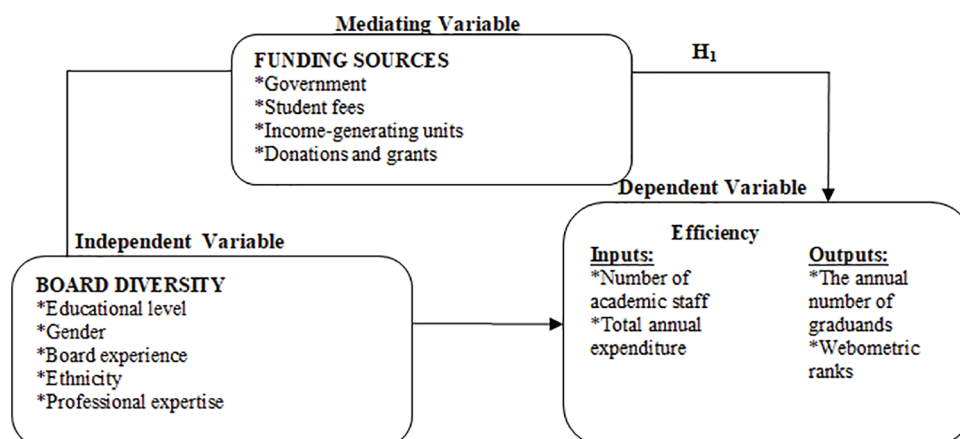


Fig. 1. Conceptual framework.

TABLE I: DESCRIPTIVE STATISTICS FOR FUNDING SOURCES

Funding source	N	Min	Max	Mean	Std. deviation	Coefficient of variation
Government	361	0.000	0.985	0.405	0.317	0.783
Student fees	358	0.001	1.000	0.468	0.284	0.608
Income-generating units	359	0.000	0.928	0.093	0.041	0.441
Donations and grants	361	0.000	0.922	0.030	0.014	0.455

Data from yearly reports and financial statements was collected and recorded. For each variable, data was obtained from the yearly reports and official university websites and recorded in a data collection sheet to minimize omission and other errors that may result in time-saving during editing and coding. According to Mohajan (2017), panel data is widely applied since it gives increased precise inference of model parameters. It offers an increased capacity for capturing complex human behaviour than a single time series or cross-section data; it is suited for testing and constructing more complicated behavioural hypotheses; It is essential for limiting the effect of omitted variables; it uncovers dynamic relationships; it is capable of producing more concise estimates for individual upshots by data pooling in place of individual outcomes estimates generation; it generates micro-foundations for the data analysis and finally making it easier to undertake computation and statistical inference. In this study, unbalanced panel data was used since some universities were registered after 2013.

3.2. Data Analysis

Descriptive and inferential statistics were used to analyze data in this study. Two stages of analysis were employed: first, computation of efficiency scores using DEA, and second, regressing scores on the predictor variables. The mediation is a causal chain where the explanatory variable (board diversity) affects the second variable (funding sources), which in turn affects a third variable (efficiency). According to Baron and Kenny (1986), there are two main methods to evaluate the mediation: (1) The causal steps strategy, which assesses the significance of the regression weights of the individual paths in the mediation models, and the product of coefficients approach, which evaluates the significance of the indirect effect. Since this study is longitudinal, the causal steps strategy of testing mediation is the most plausible approach. Four essential conditions must be met to accomplish mediation using a causal steps strategy. First, there should be a significant link between the explanatory variable (board diversity) and the outcome variable (efficiency). Secondly, there should be a significant association between the predictor variable (board diversity) and the mediator (funding sources). Thirdly, the mediating variable (funding) may be significantly related to the outcome variable (efficiency) while controlling for the predictor variable (board diversity). Fourthly, the independent variable (board diversity) should be insignificantly related to the outcome variable (efficiency) while controlling for the mediator (funding sources).

The mediation relationships are established in four steps with the help of three regression equations (Baron &

Kenny, 1986). To determine the intervening effect of funding sources on the link between the diversity of a board and efficiency, a three-stepwise regression and hypothesis test and various approaches were formed. At each step, the significance of the path coefficient was observed.

In Step 1, simple panel regression analysis was undertaken with board diversity predicting efficiency. A general linear panel regression model stated below was applied for estimation purposes:

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \quad (1)$$

In Step 2, simple regression panel regression analysis was undertaken with board diversity predicting funding sources. A general linear panel regression model indicated below was applied for estimation purposes:

$$FS_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \quad (2)$$

In Steps 3 and 4, multiple panel regression analysis was undertaken with board diversity and funding sources predicting efficiency. A general linear panel regression model indicated below was applied for estimation purposes:

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \beta_2 FS_{it} + \varepsilon_{it} \quad (3)$$

4. FINDINGS AND DISCUSSION

The study determined descriptive statistics of funding sources measured by government grants, student fees, income-generating units, and donations and grants. The findings are in Table I.

Table I depicts that students' fees had an average mean score of 0.468, a standard deviation of 0.284, and a coefficient of variation of 60.8%. This implies that over 46% of funding sources are generated by student fees. It can also be depicted from the high coefficient of variation that there is a high variation in student fees among the universities in Kenya. Government grants also showed an average mean of 0.405, a standard deviation of 0.317 and a coefficient of variation of 78.3%. This depicts that 40% and above of the funding sources are generated from government grants with a high coefficient of variation, depicting that government grants vary sharply among the universities. Other income-generating units, donations, and grants registered the lowest mean scores of 0.093 and 0.030, respectively, implying that they contribute little to overall funding sources.

The results, therefore, depict that funding sources for the surveyed Kenyan universities are mainly from student fees and government grants, with few coming from internally generated sources, donations and grants.

The study further tested the hypothesis (H₁) that the mediating effect of the funding sources on the relationship

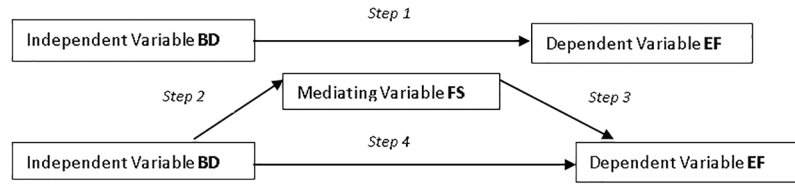


Fig. 2. Mediation process of funding sources on the relationship between board diversity and efficiency.

between board diversity and the efficiency of universities registered in Kenya is insignificant.

The mediation effect was examined following [Baron and Kenny's \(1986\)](#) method. The four stages of multiple regression analyses were completed, with each step evaluating the significance of the coefficients. Simple linear regression is used in the first two phases, whereas multiple regression is used in the third and fourth phases.

The structural model and mediation process were reviewed using the path coefficients based on the paths depicted in [Fig. 2 \(Baron & Kenny, 1986\)](#).

1. Step 1: Analyze the association between the independent and dependent variables. Establish the relationship between the criterion and predictor variables. The association between the variables should be statistically significant. This phase establishes the existence of a relationship that can be managed.
2. Step 2: Determine the association between the mediator and the independent variable. Show a correlation between the mediator and the independent variable. Essentially, the mediator must be considered an outcome variable at this level.
3. Step 3: Adjust for the predictor variable and determine the relationship between the criterion and the intervening variable. Establish the impact of the mediator on the outcome variable.
4. Step 4: In the presence of the mediator, the link between the predictor and criterion variables is unimportant. When the mediator is taken into account, the influence of the predictor variable on the criterion variable should be zero, showing that the variable mediates the relationship between the independent and dependent variables.

For estimation, general linear models based on the causal steps approach proposed by [Baron and Kenny \(1986\)](#) are specified as follows:

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \quad (1.1)$$

$$FS_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \quad (1.2)$$

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \beta_2 FS_{it} + \varepsilon_{it} \quad (1.3)$$

The study tested the mediation effect following [Baron and Kenny's \(1986\)](#) four-step approach. In Step 1, the relationship between board diversity and efficiency was estimated using a simple regression model and presented in [Table II](#).

[Table II](#) shows the regression analysis results. The F-test statistic was statistically significant, $F(1, 359) = 72.25$, $p <$

TABLE II: REGRESSION RESULTS OF BOARD DIVERSITY AND EFFICIENCY

Effect	Estimate	SE	95% CI		t
			LL	UL	
Intercept	2.180***	0.089	2.005	2.356	24.400***
Board diversity	0.242***	0.028	0.186	0.298	8.500***
Observations	361				
R ²	0.167				
Adjusted R ²	0.165				
F Statistic	72.25***				
	(df = 1, 359)				

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; CI = confidence interval; LL = lower limit; UL = upper limit.

TABLE III: REGRESSION RESULTS OF BOARD DIVERSITY AND FUNDING SOURCES

Effect	Estimate	SE	95% CI		t
			LL	UL	
Intercept	2.753***	0.094	2.569	2.938	29.310***
Board diversity	0.159***	0.030	0.100	0.218	5.320***
Observations	361				
R ²	0.073				
Adjusted R ²	0.071				
F Statistic	28.35***				
	(df = 1, 359)				

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; CI = confidence interval; LL = lower limit; UL = upper limit.

0.001, meaning that the regression model was statistically significant. According to these results, board diversity ($\beta = 0.242$, $p < 0.001$) significantly predicts efficiency. R-squared value of 0.167 points out that board diversity explains 16.7% of the variance in the efficiency of universities in Kenya.

The linear regression analysis model of:

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \quad (4)$$

becomes

$$EF_{it} = 2.181 + (0.242)BD_{it} + \varepsilon_{it} \quad (5)$$

Step 2 investigated the link between the predictor and mediator variables: board diversity and funding sources. The outcome variable is the mediator. [Table III](#) presents the outcome.

The regression analysis results are as in [Table III](#). The F-test statistic was statistically significant, $F(1, 359) = 28.35$, $p < 0.001$, implying that the regression model is statistically significant. Further, the results show that board diversity ($\beta = 0.159$, $p < 0.001$) significantly predicts funding sources. The R-squared value of 0.073 shows that board

TABLE IV: REGRESSION RESULTS OF FUNDING SOURCES AND EFFICIENCY

Effect	Estimate	SE	95% CI		t
			LL	UL	
Intercept	1.399***	0.155	1.096	1.704	9.050***
Funding sources	0.462***	0.047	0.370	0.555	9.830***
Observations	361				
R ²	0.212				
Adjusted R ²	0.210				
F Statistic	96.66***				
	(df = 1, 359)				

Note: *p < 0.05; **p < 0.01; ***p < 0.001; CI = confidence interval; LL = lower limit; UL = upper limit.

diversity explains 7.3% of the variance in the funding sources of universities in Kenya.

The linear regression analysis model of

$$FS_{it} = \beta_0 + \beta_1 BD_{it} + \varepsilon_{it} \tag{6}$$

becomes

$$FS_{it} = 2.754 + (0.159)BD_{it} + \varepsilon_{it} \tag{7}$$

In Step 3 of the mediation process, efficiency and funding sources were regressed to establish the association between the predictor and mediating variables. The results are presented in Table IV.

Table IV shows the regression analysis results. The F-test statistic was statistically significant, $F(1, 359) = 96.66$, $p < 0.001$, implying that the regression model is statistically significant. Further, the results show that funding sources ($\beta = 0.462$, $p < 0.001$) significantly predict efficiency. R-squared value of 0.212 points that funding sources account for 21.2% of the variance in the efficiency of universities in Kenya.

The linear regression analysis model of

$$EF_{it} = \beta_0 + \beta_1 FS_{it} + \varepsilon_{it} \tag{8}$$

becomes

$$EF_{it} = 1.399 + (0.462)FS_{it} + \varepsilon_{it} \tag{9}$$

Step 4 involved regressing efficiency on board diversity and funding sources. The regression results are presented in Table V.

The results in Table V reveal that the regression model was statistically significant, with $F(2, 358) = 76.57$, $p < 0.001$, implying that it is statistically significant. Both board diversity and funding sources are significant predictors of efficiency ($\beta = 0.181$, $p < 0.001$) and ($\beta = 0.379$, $p < 0.001$), respectively. The adjusted R-squared (R^2) value was 0.296, signifying that board diversity and funding sources together explain 29.6% of the variance in the efficiency of universities in Kenya.

The linear regression analysis model of

$$EF_{it} = \beta_0 + \beta_1 BD_{it} + \beta_2 FS_{it} + \varepsilon_{it} \tag{10}$$

becomes

$$EF_{it} = 1.137 + (0.181)BD_{it} + (0.379)FS_{it} + \varepsilon_{it} \tag{11}$$

TABLE V: REGRESSION RESULTS OF BOARD DIVERSITY, FUNDING SOURCES, AND EFFICIENCY

Effect	Estimate	SE	95% CI		t
			LL	UL	
Intercept	1.137***	0.151	0.840	1.435	7.520***
Board diversity	0.181***	0.027	0.128	0.235	6.690***
Funding sources	0.379***	0.046	0.288	0.470	8.220***
Observations	358				
R ²	0.300				
Adjusted R ²	0.296				
F Statistic	76.57***				
	(df = 1, 358)				

Note: *p < 0.05; **p < 0.01; ***p < 0.001; CI = confidence interval; LL = lower limit; UL = upper limit.

To determine if funding sources mediate the association between the diversity of a board and efficiency, the mediation model (Step 1) must be statistically significant. The results ($p < 0.001$) show that the relationship is statistically significant. Further, the funding sources should be statistically significant and related to board diversity in Step 2. Model 2 was statistically significant according to the results of the study. Furthermore, Step 3 requires that funding sources and efficiency have a statistically significant association. According to the study results, there was a statistically significant relationship between funding sources and efficiency ($p > 0.05$). There was also a statistically significant relationship between efficiency, board diversity and funding sources ($p < 0.001$). When the mediator is taken into account (controlled), the influence of the predictor variable on the criterion variable should be zero, showing that the variable mediates the relationship between the independent and dependent variables. Because the independent variable (board diversity) is a significant predictor of efficiency and not zero (Step 4) and all Steps 1, 2 and 3 significantly met the mediation threshold, the relationship between board diversity and efficiency is partially mediated by funding sources.

5. LIMITATIONS OF THE STUDY

Although this study had some limitations, every effort was made to guarantee that they did not significantly affect the results. The absence of solitary universally accepted indicators for measuring board diversity, funding sources, and institutional characteristics has significantly contributed to disparities in choosing and operationalising this set of study variables. Differences in the variable metrics have made it challenging to contrast and possibly compare the bulk of the prior empirical findings owing to mixed outcomes. While this study adopted educational level, gender, board experience, ethnicity and professional expertise as measures of board diversity, other studies have employed different measures such as nationality, age, independence and education diversity to measure board diversity. Similarly, other studies have adopted distinct measures such as SFA, ROA, ROE or EPS to measure efficiency instead of DEA, which was employed in the

current study. Other studies have utilized total assets and the number of branches/campuses to measure institutional characteristics, unlike this study, which has used the number of students and the age of the institution. The study also applied the Shannon diversity index to produce the composite values because it was possible to find them in the financial statements, and it is more robust when dealing with interval or ratio scale data. The study's conclusions were limited to these values, which, if computed directly, could have impacted the relationships investigated differently.

6. SUGGESTIONS FOR FUTURE RESEARCH

To widen the scope of the study, the suggestion for future research is given since the current study utilized data from a single country setting (Kenya) to probe the relationship among board diversity, funding sources, and efficiency. As a result, the upshots may not possibly apply or can be generalized to other markets (developed or developing) owing to inconsistencies in fiscal, administrative, regulatory, and cultural undercurrents amongst countries. Future empirical investigations can mitigate these shortcomings by utilizing additional wide-ranging datasets from cross-country samples to alleviate these intrinsic limitations.

CONFLICT OF INTEREST

The authors declare that they do not have any conflict of interest.

REFERENCES

- Abosede, A. J. (2012). Pecking order theory of capital structure: Another way to look at it. *Journal of Business Management and Applied Economics*, 4(5), 1–11.
- Adeabah, D., Gyeke-Dako, A., & Andoh, C. (2019). Board gender diversity, corporate governance and bank efficiency in Ghana: A two-stage data envelope analysis (DEA) approach. *Corporate Governance (Bingley)*, 19(2), 299–320.
- Agasisti, T., & Johnes, G. (2009). Beyond frontiers: Comparing the efficiency of higher education decision-making units across more than one country. *Education Economics*, 17(1), 59–79.
- Alfiero, S., Cane, M., Doronzo, R., & Esposito, A. (2019). Board diversity and efficiency evaluation evidence from European listed manufacturing companies. *International Business Management*, 13(3), 92–100.
- Ali, F., Wang, M., Jebran, K., & Ali, S. T. (2021). Board diversity and firm efficiency: Evidence from China. *Corporate Governance (Bingley)*, 21(4), 587–607.
- Ararat, M., Aksu, M., & Cetin, A. T. (2015). How board diversity affects firm performance in emerging markets: Evidence on channels in controlled firms. *Corporate Governance: An International Review*, 23(2), 83–103.
- Avkiran, N. K. (2001). Investigating technical and scale efficiencies of Australian universities through data envelopment analysis. *Socio-Economic Planning Sciences*, 35(1), 57–80.
- Baron, R., & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173–1182.
- Barra, C., & Zotti, R. (2013). Measuring teaching and research efficiency in higher education using data envelopment analysis: A case study from the university of Salerno. *Quaderno Di Ricerca*, 3, 1–30.
- Coupet, J. (2017). Strings attached? Linking historically black colleges and universities public revenue sources with efficiency. *Journal of Higher Education Policy and Management*, 39(1), 40–57.
- CUE (2021). *State of University Education in Kenya (2020/2021)*. Nairobi, Kenya: Commission of University Education.
- Doeringer, P. B., & Piore, M. J. (1971). Internal labor markets and manpower analysis. *Industrial and Labor Relations Review*, 25(2), 273.
- Erkoç, T. E. (2016). Measuring efficiencies of Turkish public universities with non-parametric efficiency estimation method. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi*, 29(3), 124–136.
- Galia, F., & Zenou, E. (2013). Does board diversity influence innovation? The impact of gender and age diversity on innovation types. *Conférence Internationale de Management Stratégique*, pp. 10–12.
- García-Aracil, A. (2013). Understanding productivity changes in public universities: Evidence from Spain. *Research Evaluation*, 22(5), 351–368.
- Hillman, A. J. (2015). Board diversity: Beginning to unpeel the onion. *Corporate Governance: An International Review*, 23(2), 104–107.
- Hillman, A. J., & Dalziel, T. (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management Review*, 28(3), 383–396.
- Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial behaviour, agency costs, and ownership structure. *Human Relations*, 3(4), 305–360.
- Jerzemska, M. (2006). The main agency problems and their consequences. *Acta Oeconomica Pragensia*, 14(3), 9–17.
- Johnes, J. (2013). Efficiency and mergers in English higher education 1996/97 to 2008/09: Parametric and non-parametric estimation of the multi-input multi-output distance function. *Manchester School*, 82(4), 465–487.
- Konrad, A. M., Prasad, P., & Pringle, J. K. (2016). Handbook of workplace diversity. *Academy of Management Review*, 31(4), 1100–1102.
- Krishnan, H. A., & Park, D. (2005). A few good women—on top management teams. *Journal of Business Research*, 58(September 2004), 1712–1720.
- Kuah, C. T., & Wong, K. Y. (2011). Efficiency assessment of universities through data envelopment analysis. *Procedia Computer Science*, 3, 499–506.
- Lee, B. L. (2011). Efficiency of research performance of Australian universities: A reappraisal using a bootstrap truncated regression approach. *Economic Analysis and Policy*, 41(3), 195–203.
- Li, H., & Chen, P. (2018). Board gender diversity and firm performance: The moderating role of firm size. *Business Ethics: A European Review*, 27(4), 294–308.
- Lincoln, A., & Adedoyin, O. (2012). Corporate governance and gender diversity in Nigerian boardrooms. *World Academy of Science, Engineering and Technology*, 71, 1853–1859.
- Maria, T. D., & Bleotu, V. (2014). Modern trends in higher education funding. *Procedia-Social and Behavioral Sciences*, 116, 2226–2230.
- Mathenge, P. W., & Muturi, W. (2017). Effect of financial management practices on performance of public universities in Kenya. *International Journal of Social Sciences and Information Technology*, 3(8), 2354–2363.
- McMillan, M. L., & Datta, D. (1998). The relative efficiencies of Canadian universities: A DEA perspective. *Canadian Public Policy/Analyse de Politiques*, 24(4), 485–511.
- Mohajan, H. K. (2017). Two criteria for good measurements in research: Validity and reliability. *Annals of Spiru Haret University. Economic Series*, 17(4), 59–82.
- Munoz, D. A. (2016). Assessing the research efficiency of higher education institutions in Chile—A data envelopment analysis approach. *International Journal of Educational Management*, 30(6), 809–825.
- Mutiso, J. M., Onyango, P. M., & Nyagol, M. (2015). Effects of funding sources on access to quality higher education in public universities in Kenya: A case study. *International Journal of Business and Social Research*, 5(3), 68–81.
- Myeki, L. W., & Temoso, O. (2019). Efficiency assessment of public universities in South Africa, 2009–2013: Panel data evidence. *South African Journal of Higher Education*, 33(5), 264–280.
- Nguta, M. H., & Ndegwa, J. (2021). Finance & Banking studies the mediating effect of firm revenue on the relationship between board characteristics on financial distress of deposit taking sacco in Nairobi county. *International Journal of Finance & Banking Studies*, 10(1), 34–47.
- Nirajini, A., & Priya, K. B. (2013). Impact of capital structure on financial performance of the listed trading companies in Sri Lanka. *International Journal of Scientific and Research Publications*, 3(5), 1–9.
- Odhiambo, G. (2018). The role of Kenyan universities in national development. *Forum for International Research in Education*, 4(3), 191–209.

- Salmi, J., & Hauptman, A. M. (2006). Resource allocation mechanisms in Tertiary education: A typology and an assessment. In Global University Network For Innovation (Ed.), *Higher Education in the World 2006—The Financing of Universities* (pp. 60–83). London: Palgrave Macmillan.
- Selim, S., & Bursalioglu, S. A. (2013). Analysis of the determinants of universities efficiency in Turkey: Application of the data envelopment analysis and panel tobit model. *Procedia Social and Behavioral Sciences*, 89, 895–900.
- Timmerman, T. A. (2000). Racial diversity, age diversity, interdependence, and team performance. *Small Group Research*, 31(5), 592–606.
- Wolszczak-Derlacz, J. (2017). An evaluation and explanation of (in) efficiency in higher education institutions in Europe and the U.S. with the application of two-stage semi-parametric DEA. *Research Policy*, 46(9), 1595–1605.
- Yaisawarnng, S., & Ng, Y. C. (2014). The impact of higher education reform on research performance of Chinese universities. *China Economic Review*, 31, 94–105. 6.
- Zezeza, P. T. (2020, March 12)). The crisis facing higher education and what can be done about it. The Elephant. Available at: <https://www.theelephant.info/ideas/2020/03/12/the-crisis-facing-higher-education-and-what-can-be-done-about-it/>.