JAFA, 12(1), June 2025, 43-55 P-ISSN: 1979-6862
DOI: 10.21512/jafa.v12i1.13443 E-ISSN: 2746-6019

CONTROLLING CORRUPTION TO STRENGTHEN THE ROLE OF THE EDUCATION BUDGET FUNCTION IN ACHIEVING SDG 4 IN INDONESIA

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ABSTRACT

Disparities in education budgets across regions, limited access to remote areas, and low participation rates at all educational levels represent significant challenges for Indonesia in achieving SDG 4 by 2030. This study investigates the contribution of education function expenditure to attaining SDG 4, with corruption control as a moderating variable. Utilizing 1,016 observations of secondary data from provincial, district, and city governments during 2021–2022, the findings reveal that education budgets substantially support SDG 4 achievement. However, overly procedural corruption control mechanisms diminish the effectiveness of budget utilization by restricting the flexibility in fund allocation. The scientific contribution of this research lies in providing empirical evidence on the moderating effect of corruption control on the effectiveness of education budgets in achieving SDG 4. From a practical standpoint, the study recommends the adoption of adaptive, risk-based corruption control mechanisms such as Risk-Based Internal Audit and performance-based fund disbursement systems to strike a balance between accountability and flexibility in budget management. This study is limited to district and city-level data over two years and focuses exclusively on the education function, thus, its findings may not fully represent conditions at the provincial level or other SDG sectors. Future research should broaden data coverage and incorporate qualitative methodologies to deepen understanding of bureaucratic processes and corruption control dynamics.

Keywords: *Education Function Budget, SDG 4, CCEI, Good Governance.*

INTRODUCTION

Quality education constitutes a crucial component of the 2030 Sustainable Development Goals (SDGs). Beyond serving as a fundamental human need, education is the primary foundation for enhancing human resource quality and supporting national development (Mia Audina et al. 2023). However, systemic corruption in Indonesia, including within the education sector, represents a significant barrier undermining various aspects of education, ranging from budget allocation and facility provision to student selection and procurement of teaching materials (Aini et al. 2024). Several studies have investigated the relationship between education budget allocations and corruption control in achieving the SDGs. Alfarizi et al. (2024) emphasize the critical role of education budget allocation in Southeast Asia, while Sakinah et al. (2024) highlight the role of corruption control in ensuring the efficient utilization of SDG-related funds. Nonetheless, concurrently integrates these two aspects, particularly at the local government level in Indonesia. This study aims to address this gap by examining the impact of education budget allocation on SDG 4 indicators and assessing how corruption control influences the effectiveness of budget utilization. Accordingly, the findings of this research are expected to contribute to more responsive policy recommendations for the management of education budgets, thereby accelerating the attainment of inclusive and quality education goals.

In achieving the Sustainable Development Goal (SDG) for quality education, four key indicators are commonly used to measure progress: Net Enrollment Rate (NER), Gross Enrollment Rate (GER), Average Length of Schooling (ALS), and Expected Length of Schooling (ELS). NER represents the

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proportion of school-aged children enrolled at the appropriate level of education, and it can exceed 100% in urban areas with better access to schools (Safira & Wibowo, 2021). GER measures overall participation in education, including students outside the official age range (Reza & Retnawati, 2020). ALS reflects the average number of years of formal education completed by individuals aged 25 and abov. At the same time, ELS estimates the number of years of schooling a child entering the system is expected to complete based on current trends (Badan Pusat Statistik, 2020). Since 2010, ELS has also been a primary indicator in calculating the Human Development Index (HDI). Collectively, these four indicators offer a comprehensive assessment of the effectiveness of education funding and governance in supporting the achievement of SDG 4 in Indonesia.

Law Number 20 of 2003, which governs the National Education System, governs many aspects of Indonesia's educational system. Ensuring equal access to education, improving educational standards, and boosting the efficiency of school administration are its primary objectives. The education budget is one of the most important pillars supporting high-quality education. The regional government allocates 20% of the APBN (State Budget) to education annually. However, implementing this 20% allocation has not resulted in significant improvements in Indonesia's human development. This increase is primarily due to unequal distribution of educational infrastructure in rural areas, the ineffective implementation of the nine-year compulsory education program, and the geographical challenges posed by Indonesia's archipelagic nature (Ahmad Fajar, 2024).

Controlling corruption is a crucial factor in achieving SDG 4, which focuses on inclusive and quality education. Unterhalter (2019) highlights that although SDG 4 sets ambitious targets, there remains a gap between these aspirations and the indicators used to measure progress. Like other developing countries, Indonesia is confronted with significant social, economic, and political challenges due to widespread corruption and bribery (Furqan et al, 2019). Corrupt practices among policymakers indicate weaknesses in the legal system, as well as the absence of justice and strong institutions. Effective corruption control is believed to enhance the efficient use of the education budget, enabling local governments to manage educational funds in accordance with actual needs. As a result, strong corruption control measures are thought to make better use of the education budget, helping to achieve progress toward SDG 4.

Based on the data and analysis, this study has drawn several conclusions. First, the education function's funding positively impacts the education SDG. The study's findings corroborate those of Alfarizi et al, (2024), who found that allocating funds for education in Southeast Asian nations like Indonesia is crucial to guaranteeing the caliber of education needed to meet the SDG 4. Second, the education budget negatively impacts the CCEI.Third, controling corruption has a detrimental impact on the SDG 4 success metrics, which include Expected Years of Schooling, Net Enrollment Rate, and Gross Enrollment Rate. The second and third conclusions differ from the study by Sakinah, H., et al, (2024), which states that stopping corruption is essential for ensuring that funds meant for achieving the SDGs are used effectively, efficiently, and transparently. Although certain benefits are associated with expanding educational resources in various places, the study's findings demonstrate that corruption significantly hinders workforce quality development (Thi Hoa, T, 2020). Controlling corruption has a negative impact on education goals (SDG 4). CCEI, which might be too strict or complicated, can limit how budgets are used in education, making it harder to effectively support the goals for education under SDG 4. To help a country reach its education goals, it's important to build a strong government that improves financial reporting quality, especially by fully using the accrual accounting method, and to take real actions against corruption (Saud & Furqan, 2024). This study has implications for the importance of developing an education budget policy that focuses on increasing fund allocations and more flexible and responsive control mechanisms. This work needs to be done to implement corruption control without hindering effective budget use.

LITERATURE REVIEW

Good Governance

All levels of governance, both locally and nationally, implement the decision-making process. On the other hand, accountability, involvement, consensus, transparency, efficacy and efficiency, equality and inclusivity, and adherence to the law are all considered aspects of good governance. Aspects of good governance include: (1) efficient, transparent, open, non-corrupt, and accountable public institutions

at all levels, including clear decision-making processes; (2) efficient and effective management of financial, human, and economic resources to promote sustainable and equitable development; (3) democratic society that is governed by democratic principles and human rights; (4) civil society participation in the decision-making process; (5) the ability to use legal processes to enforce rights and duties is known as law enforcement (Zuhro, 2016; Nopriadi Saputra & Riant Nugroho, 2021). Aspects of good governance include enforcing budgetary discipline, avoiding the misallocation of investment funds, preventing political and administrative corruption, implementing sound and responsible development management in line with democratic and efficient market principles, and creating a legal and political framework for the growth of business operations (World Bank, 1992; Kharisma, Bayu, 2014).

Sustainable Development Theory

Sustainable development is development that meets present needs without compromising the ability of future generations to meet their own. This concept emphasizes the importance of prioritizing basic needs, particularly for the poor, while preserving the environment an effort shaped by social structures and technological progress (Wibisana, 2014). Reducing corruption in education budget management is crucial to ensure efficient and equitable fund distribution, thereby supporting Indonesia's achievement of the SDG 4. For developed countries, sustainable development can also establish a new framework for international relations based on humanitarian values and shared interests, while accelerating progress in developing nations (Estes, 2010; Fitria et al. 2024). The SDGs consist of 17 core goals, including ending poverty, improving health, providing quality education, achieving gender equality, ensuring access to clean water and energy, promoting sustainable economic growth, fostering innovation, reducing inequality, and taking action on climate change and environmental protection. The program also outlines 169 targets to be pursued globally over the 2016–2030 period (Lestari et al. 2024).

The Influence of The Education Function Budget on SDG 4

The education sector plays an important role in improving the quality of human resources in Indonesia. However, educational achievement is still far from the SDG 4 target, with gaps that hinder access to decent schools. Strategic steps such as increasing funding, involving local organizations, and improving the quality and accountability of teachers are needed, especially in disadvantaged, remote, and poor areas, to realize equal education (Ratnasari et al, 2024). The law's mandate and other legal requirements serve as the foundation for Indonesia's program to improve the quality of its human resources. One of the most crucial provisions in establishing the Indonesian national education system is Article 31 of the 1945 Constitution. Bintang et al. 2024 This article governs each citizen's entitlement to a respectable and high- quality education.

The allocation of the education budget in Southeast Asian countries such as Indonesia is an important focus in ensuring the quality of education to support the SDGs (Alfarizi et al, 2024) The budget has an important role in supporting the achievement of the Sustainable Development Goals (SDGs). Around 30.7% of budget programs contribute to SDG 4, with many education programs showing positive impacts (Sisto et al, 2020). Thus, in line with SDG 4 objectives, the budget for the education function is anticipated to promote the attainment of inclusive and equitable high-quality education and expand possibilities for lifelong learning for everyone. The following is one way to formulate the hypothesis:

H1: The role of the education function budget has a positive effect on SDG 4

The Influence of CCEI in Strengthening the Influence of the Education Function Budget on SDG 4

The problem of corruption in Indonesia is a serious threat that damages the life of the nation and state. Corruption is not only a legal problem but also a real threat to the welfare of society and the state (Anisa et al, 2024). Corrupt practices indicate a weak legal system and a lack of justice and strong institutions, which will hinder the goal of 16 SDGs that focuses on improving good governance in Legal Development and Governance, ultimately impacting the achievement of the targets set in the

2030 SDGs roadmap. (Guritno, et al, 2020). To guarantee that funds allotted to accomplish the SDGs are spent effectively, efficiently, and transparently, corruption control is crucial (Sakinah, H et al, 2024). Eliminating corruption has become a primary goal to enhance personal growth and strengthen national resilience (Salsadila et al, 2023). Sisto et al, (2020) also revealed that the budget plays a significant role in supporting the achievement of SDG 4, where around 30.7% of budget programs contribute to SDG 4, with many education programs showing positive impacts. Thus, the government's policy of eradicating corruption needs to be supported by a comprehensive plan to achieve the desired results (Ismail, 2020). Controlling corruption in the education budget is a crucial step to ensure that funds are allocated appropriately, transparently, and accountably to support the achievement of SDG in the education sector. However, suppose this control is carried out excessively or too procedurally. In that case, the flexibility and effectiveness of budget use can be hampered, thereby reducing optimization in achieving inclusive, quality, and equitable education targets for sustainable human resource development. Therefore, procedural corruption control is considered an obstacle to achieving SDG 4. The hypothesis can be formulated as follows:

H2: The role of CCEI has a negative effect in strengthening the influence of the Education function budget on SDG 4

RESEARCH METHOD

Data

This quantitative investigation uses multiple regression analysis approaches. For the years 2021–2022, 542 local governments in Indonesia including city, district, and provincial administrations provided the data. There is a final sample of 508 observations because 34 districts/cities do not yet have data on the fourth SDG's attainment. Over the course of the two-year investigation, 1,016 observations were made. All of the data used in this study came from Indonesian government agencies, particularly the BPKP, which provided the data for the Corruption Control Effectiveness Index Performance Report. Meanwhile, SDG four data on education, measured based on (Gross participation rate, Pure participation rate, Average length of schooling, and expected length of schooling) is accessed through the Ministry of Education and Culture and BPS. Finally, the education budget function data comes from BPK or the Ministry of Finance.

Empirical Model and Operationalization of Variables

We use the research model to explain and forecast how changes in one variable affect other variables. The model for empirical research is as follows:

$$SDG4_{it} = \beta0 + \beta1Ccei_{it} + \beta2Bfe_{it} + \beta3Ages_{it} + \beta34Size_{it} + \beta5Island_{it} + \varepsilon t \ldots.1).$$

$$SDG4_{it} = \beta0 + \beta1Ccei_{it} + \beta2Bfe_{it} + \beta3(Ccei\ X\ Bfe)_{it} + \beta4Ages_{it} + \beta5Size_{it} + \beta5Island_{it} + \varepsilon t \ldots. (2).$$

The main variable in this study is BFE, which is quantified using the natural logarithm of the education function budget. SDG 4 is assessed based on the level of education in Indonesia, ranging from primary school to high school, and is further evaluated through indicators such as the average length of schooling and the expected length of schooling. The moderating variable, the Corruption Control Effectiveness Index, is measured on a level from 1 to 5, with each level indicating a specific degree of control effectiveness. A level of 1 reflects poor corruption control, characterized by numerous violations and ineffective measures that require significant improvement. At level 2, corruption risk is partially controlled, but it continues to have a major negative impact on organizational performance and public services, indicating that the control process is still in a developmental phase. Level 3 represents moderate control, where the organization manages to reduce corruption risk, though a considerable impact on performance and public services remains, necessitating continuous enhancement of control measures. A score of 4 signifies good control effectiveness, with minimal adverse effects on performance and public services; however, further refinement of control mechanisms is needed. Finally, a score of 5 denotes very effective corruption control, where risks are well managed and no significant impact on organizational performance or public services is observed, demonstrating a highly effective control system within the organization.

This scale provides a straightforward yet accurate tool to evaluate the degree of success in eradicating corruption, ranging from the most unfavorable conditions to the optimal situation.

This study uses $Ages_{it}$, $Size_{it}$, and $Island_{it}$ as control variables. The calculation of $Ages_{it}$ uses the natural logarithm (Ln) of the total asset value of the local government as of 2022. AGES Based on the number of years the local government has been in operation up until 2021– 2022, it shows the age of the local government from 2021–2022. Island The local government's geographic location is determined by a dummy variable, which has a value of "1" if it is situated on the island of Java and "0" otherwise.

Table 1 Variable Operationalization Of Variables

Name	Operationalization Of Variables	Data Sources
CCEI	Corruption Control Effectiveness Index (CCEI) measured through 1. Capabilities 2. Application 3. Handling 1-5 level measurement approach	Financial and Development Supervisory Agency (BPKP)
BFE	Budget Function Education of provincial regency/city governments in Indonesia as measured by the natural logarithm of the education function budget.	Ministry of Finance
SDG4	Sustainable Development Goal 4, pertaining to education, is measured by: 1. Gross Enrollment Rate (GER): Range ES, JHS. SHS 2. Net Enrollment Participation Rate (NEP): Range ES, JHS, SHS 3. Average Years of Schooling 4. Expected Length of Schooling	Ministry of Education and Culture, and Central Bureau of Statistics (BPS)
Ages	Age of Local Government, measured by the number of years since the formation of the local government in 2021-2022.	Ministry of Home Affairs
Size	The size of the Regional Govemment in 2021-2022, measured by the natural logarithm (Ln) value of the total assets of the Regional Government of the Republic of Indonesia Financial Audit Agency	Financial Supervisory Agency (BPK)
Island	Geographical location of Local Government measured by Island dummy Le. "I" is Java Island, "" is other.	Ministry of Home Affairs

Source: Author

DESCRIPTIVE STATISTIC

Table 2 Statistical Description of Variables

Description	Mean	Standard Deviation	Min	Max
ALS	8.44	1.57	1.42	13.03
ELS	13.05	1.3	3.87	17.81
GERes	100.01	5.51	69.77	120.38
GERjhs	102.48	7.7	53.66	114
GERshs	97.1	15.6	10.56	143.34
NERes	89.23	7.22	46.96	99.6
NERjhs	74.69	9.22	30.11	98.07
NERshs	66.34	12.78	7.75	99.39
BFE*)	631.76	13.24	66.23	20.76
CCEI	1.77	0.48	1	3
Size*)	5574	2.46	793.32	544
ages	45.05	23.84	7	72

Remarks:
*) In Billion Rupiah
Number of Observations: 1.016
Explanation of variable operationalization in table 1

Source: Secondary data, STATA-17 Output (Processed, 2024)

The descriptive statistics for each of the variables examined in this study are displayed in Table 2. Four variables are used to measure the SDG 4 variable: the gross enrollment rate (GER) from elementary school to high school, the pure participation rate (APM) from elementary school to high school, the average length of schooling (ELS), and the expected length of schooling (ALS). The ELS variable's mean of 8.44 suggests that the average number of years spent in formal education by the population in 2021–2022 represents a comparatively low level and quality of education in the area The mean for ALS is 13.05, suggesting that, in 2021–2022, the expected length of schooling for children at a certain age will be felt in the future.This figure is relatively low, as a lower ALS value suggests that the community is not yet fully aware of the importance of education or the opportunities to achieve a better future. Additionally, the Gross Enrollment Rate is based on three levels of education: elementary school, junior high school, and senior high school. The Gross Enrollment Rate for elementary schools has a mean of 100.01, for junior high schools, it is 102.47, and for senior high schools, it is 97.11This figure indicates that, in 2021-2022, the Gross Enrollment Rate across all three education levels shows a high value. A higher Gross Enrollment Rate means that more school-age children are attending school at each education level in the region.

The net participation rate is based on three levels of education (elementary school to high school). The gross participation rate for elementary school shows a mean of 89.23, the net participation rate for junior high school is 74.66, and the net participation rate for senior high school is 66.35. The mean value of the Net Participation Rate in 2021-2022 is relatively high, indicating that a significant proportion of school-age residents are able to utilize educational facilities according to their respective levels of education.

Additionally, the mean value of the BFE variable is 26.70, reflecting a low education budget for 2021-2022. This result suggests a low level of government commitment to improving access to education and the quality of human resources. The mean value of the CCEI variable is 1.77, also indicating a low score for 2021-2022. Such a low level of corruption control reflects a higher prevalence of corruption in the country.

The mean value of the size variable is 28.81 in 2021-2022, indicating a low level of the education budget. The lower total government assets suggest limited fiscal capacity, meaning the government

has fewer resources available to finance education programs. As a result, the government may rely more on debt and face difficulties in handling emergencies or unexpected expenses. Finally, the mean value of the age variable indicates that the average age of the government sample was established prior to the implementation of governmental reforms in Indonesia.

Table 3 Variable Correlation Analysis

	ALS_{it}	ELS_{it}	$GER(es)_{it}$	$GER(jhs)_{it}$	$GER(shs)_{it}$	$NER(es)_{it}$	$NER(jhs)_{it}$	$NER(shs)_{it}$	BFE_{it}	$CCEI_{it}$	$Size_{it}$	$Ages_{it}$	$Island_{it}$
ALS_{it}	1.0000												
ELS_{it}	0.7846***	10000											
	0.0000												
$GER(es)_{it}$	0.1334***	0.1274***	10000										
	0.0000	0.0000											
$GER(jhs)_{it}$	0.3814***	0.5008***	0.2424***	10000									
	0.0000	0.0000	0.0000										
$GER(shs)_{it}$	0.4813***	0.5355***	0.1755***	0.5676***	10000								
	0.0000	0.0000	0.0000	0.0000									
$NER(es)_{it}$	0.3791	0.3809	0.7182***	0.5319***	0.3912***	10000							
	0.0000	0.0000	0.0000	0.0000	0.0000								
$NER(jhs)_{it}$	0.4070***	0.4863***	0.1410***	0.7540***	0.4236***	0.6674***	10000						
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000							
$NER(shs)_{it}$	0.4981***	0.5504***	0.1451***	0.5565***	0.8649***	0.5313***	0.7018***	10000					
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000						
BFE_{it}	0.1105***	0.1983***	0.1106***	0.2073***	0.0771	0.3578***	0.3828***	0.2295***	10000				
	0.0004	0.0000	0.0004	0.0000	0.0139	0.0000	0.0000	0.0000					
$CCEI_{it}$	0.1978***	0.2297***	0.0866**	0.2318***	0.1293	0.2495***	0.2879***	0.2053***	0.2515***	10000			
	0.0000	0.0000	0.0058	0.0000	0.1293**	0.0000	0.0000	0.0000	0.0000				
$Size_{it}$	0.2300***	0.1853***	0.0872**	0.0599	-0.0024	0.2467***	0.2253***	0.1199***	0.765***	0.1995***	10000		
	0.0000	0.0000	0.0054	0.0561	0.9393	0.0000	0.0000	0.0001	0.0000	0.0000			
$Ages_{it}$	0.1125***	0.2564***	0.1026**	0.2702***	0.1899***	0.3315***	0.3979***	0.3223***	0.5236***	0.2098***	0.3548***	10000	
	0.0003	0.0000	0.0011	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
$Island_{it}$	-0.0218	0.0905**	0.0991**	0.1175***	0.0461	0.2417***	0.3959***	0.2635***	0.4655**	0.0839***	0.3378***	0.4427***	10000
	0.4875	0.0039	0.0016	0,0002	0.1423	0.0000	0.0000	0.0000	0.0000	0.0074	0.0000	0.0000	

Number of observations = 1.016
Explanation of variable operationalization in table 1
***,**,*= significant P value 1%, 5%**

Source: Secondary data, STATA-17 Output (Processed, 2024)

The results of this correlation provide an overview of the strength and direction of the relationships between the variables, as shown in Table 3. Statistically, there is a correlation between the expected length of schooling, the gross enrollment rate at different education levels (primary to senior high school), the net enrollment rate at various education levels (primary to senior high school), the education function budget, and corruption control.

These factors all influence the expected duration of schooling, as well as the quality and level of education, in support of SDG 4 on education. The evidence indicates that the education SDG is not only correlated with the ability to control corruption but also with age and total assets.

TESTING

Table 4 presents the hypothesis testing and results using the multiple regression methods

Table 4 Hypothesis Testing Result
Panel A BFE Variable Have a Positive Effect On SDG 4

Variable	ALS	ELS	GER_{ES}	GER_{JHS}	GER_{SHS}	NER_{ES}	NER_{JHS}	NER_{SHS}
$cons_{it}$	-2.994	7.241	72.265	98.232	129.299	37.821	40.081	65.977
	(0.126)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BFE_{it}	0.413***	-0.015	0.914***	2.283***	1.251	2.164***	2.673***	1.465**
	(0.001)	(0.867)	(0.017)	(0.000)	(0.225)	(0.000)	(0.000)	(0.068)
$CCEI_{it}$	0.534***	0.459***	0.507*	2.776***	3.206***	2.348***	3.754***	3.804***
	(0.000)	(0.000)	(0.180)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$size_{it}$	0.738***	0.170**	0.063	-2.235***	-2.665***	-0.450	-1.654***	-1.794***
	(0.000)	(0.036)	(0.836)	(0.000)	(0.004)	(0.163)	(0.002)	(0.012)
$ages_{it}$	0.007***	0.011***	0.027***	0.063***	0.128***	0.355***	0.068***	0.115***
	(0.002)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$island_{it}$	-0.406***	-0.147	-2.953***	-0.383**	-1.359	1.061**	5.350***	4.640***
	(0.001)	(0.122)	(0.000)	(0.407)	(0.177)	(0.013)	(0.000)	(0.000)
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adj R-Squarred	0.105	0.105	0.053	0.127	0.054	0.182	0.280	0.147
Vif	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90

Number of observations: 1.016
Explanation of variable operationalization in table 1
***, **, * = Significant P value 1%, 5%

Source: Secondary data, STATA-17 Output (Processed, 2024)

Panel B CCEI Variables Have A Negative Effect On BFE In Achieving SDG 4

Variable	ALS	ELS	GER_{ES}	GER_{JHS}	GER_{SHS}	NER_{ES}	NER_{JHS}	NER_{SHS}
$cons_{it}$	-28.78	-14.850	6.42	-55.593	-82.497	-106.862	-114.305	-100.391
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BFE_{it}	0.496**	0.764***	3.238***	7.712***	8.727***	7.271***	8.123***	7.337***
	(0.073)	(0.005)	(0.001)	(0.000)	(0.004)	(0.000)	(0.000)	(0.001)
$CCEI_{it}$	14.013***	12.007***	34.927***	83.188***	113.922***	77.981***	84.459***	90.772***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)
$(BFE*CCEI)_{it}$	-0.505***	-0.433***	-1.291***	-3.016***	-4.153***	-2.837***	-3.027***	-3.262***
	(0.000)	(0.000)	(0.003)	(0.000)	(0.002)	(0.000)	(0.000)	(0.001)
$size_{it}$	0.795***	0.219**	0.207	-1.898***	-2.202**	-0.134**	-1316***	-1.430**
	(0.000)	(0.008)	(0.506)	(0.000)	(0.018)	(0.790)	(0.017)	(0.049)
$ages_{it}$	0.006***	0.010***	0.024***	0.056***	0.120***	0.043***	0.062***	0.108***
	(0.008)	(0.000)	(0.004)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$island_{it}$	-0.424***	-0.172**	-2.999***	-0.491	-1.507	0.960**	5.242***	4.524***
	(0.001)	(0.162)	(0.000)	(0.291)	(0.137)	(0.023)	(0.000)	(0.000)
Prob > F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Adj R-Squarred	0.1252	0.1266	0.0636	0.1565	0.0674	0.2118	0.3011	0.1593
Vif	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90

Number of observations: 1.016
Explanation of variable operationalization in table 1
***, **, * = Significant P value 1%, 5%

Source: Secondary data, STATA-17 Output (Processed, 2024)

Panel A shows that the role of the education function budget has a positive effect on SDG 4. The results of the study indicate that a higher education function budget tends to result in higher achievements in SDG 4. The education function budget (BFE) has a significant influence on several variables used to measure SDG 4. The variables influenced by the education function budget include the average length of schooling (ALS), expected length of schooling (ELS), gross enrollment rate (GER) from elementary to high school, and net enrollment rate (NER) from elementary to high school. These findings support the first hypothesis, which states that the education function budget plays a role in achieving the education SDG 4 in Indonesia. The Education SDG variables, namely ALS, ELS, GER (from elementary to high school), and NER (from elementary to high school), all show a positive

influence when there is a larger education budget, with coefficients of 0.413, - 0.015, 0.914, 2.283, 1.251, 2.164, 2.673, and 1.465, respectively. These coefficients are significant at the 1 percent level for the education function budget on the four SDG 4 achievement measures: ALS, ELS, GER, and NER (from elementary to junior high school). However, the education function budget does not affect the expected length of schooling or the NER at the senior high school level. The BFE's significance on NER in senior high school at the 5 percent level is 1.465. Concerning the role of control variables in this study, the "size" control variable demonstrates a significant effect on ELS at the 5 percent level, while the "island" control variable exhibits a significant effect on the GER for senior high schools and NER at the elementary school level, also at the 5 percent level.

Then Panel B shows that the role of the Corruption Control Effectiveness Index has a negative influence on strengthening the influence of the education function budget on the SDG 4. This is supported because when corruption control is used as a mediator, it influences weakening the role of the education function budget in achieving the education SDG target. The BFE variable exerts a significant impact on several variables used to measure SDG 4, where the functions influenced by BFE are ALS, ELS, GER from (elementary school to high school), The NER from elementary to high school levels supports the first hypothesis, indicating that the education function budget plays a role in achieving the education-related SDG 4 in Indonesia.

The SDG 4 Education variable, which include ALS, ELS, GER from primary to high school, and NER from primary to high school, show a positive effect when there is a large education budget, with values of 0.496, 0.764, 3.238, 7.712, 8.727, 7.271, 8.123, and 7.337, respectively. This effect is significant at the 1 percent level for the education budget's impact on ELS, GER from elementary to high school, and NER from elementary to high school, and at the 5 percent level for ALS. Additionally, the CCEI moderation variable positively affects achieving quality education SDG 4, with a significance level of 1 percent. However, the results show that after CCEICCEI moderates the budget variable for the education function moderates the budget variable for the education function, corruption control has an influence in weakening the role of the education function budget in achieving the education SDG target.

RESULT

The results of hypothesis testing indicate that the education budget (BFE) and corruption control effectiveness (CCEI) significantly impact the achievement of development goals. However, when corruption control is implemented through rigid procedural mechanisms, the effectiveness of education budgets in advancing SDG 4—focused on quality education—tends to diminish. Stringent anti-corruption procedures, such as multilayered administrative requirements, repeated verifications, and hierarchical approvals, frequently result in delayed fund disbursement, reduced managerial flexibility at schools, and complicated procurement and program implementation processes. In certain contexts, these procedural constraints reduce budget absorption capacity and hinder the attainment of critical educational targets, particularly in remote or institutionally limited regions.

For example, a study conducted at Madrasah Ibtidaiyah Arraoda in Kota Sorong revealed that despite generally sound management of BOS funds, delays in fund disbursement and complex accountability procedures obstructed the smooth conduct of teaching and learning activities at the start of the semester. Furthermore, the allocation for honorarium teachers' salaries rose to 50%, exceeding the ideal cap of 30%, driven by demands from the K-13 curriculum, consequently limiting expenditures for other educational necessities (Rukmana et al. 2022). This case substantiates that overly procedural corruption control negatively moderates the effectiveness of education funding. Similarly, research by Tuakara (2025) in Malind District, Merauke Regency, demonstrated that while Special Autonomy Funds contributed significantly to the development of educational infrastructure, implementation was impeded by delayed fund distribution and uneven allocation among schools. These challenges were exacerbated by limited human resource capacity at the district level and weak inter-agency coordination. Additionally, suboptimal involvement of local communities in monitoring and evaluation processes potentially undermined accountability and policy effectiveness.

In light of these findings, corruption control mechanisms should be designed with greater flexibility and adaptability. Tania (2022) advocates for adopting Risk-Based Internal Audits (RBIA), focusing oversight efforts on key risk areas rather than uniformly auditing all activities. This approach facilitates

efficient supervision without obstructing program implementation. Similarly, performance-based fund disbursement links budgeting to specific outcomes and enables dynamic evaluation while maintaining accountability. Such strategies are critical for sustaining effective corruption control while minimizing bureaucratic impediments that can delay budget absorption.

Mendelski (2020) further emphasizes that excessively repressive anti-corruption measures disregarding procedural fairness provoke adverse responses from legal actors such as judges, lawyers, and scholars. Disproportionate prosecutions and procedural abuses generate perceptions of injustice, eliciting criticism from international bar associations and judicial bodies. Affected civil society groups including collateral victims of stringent anti-corruption policies—have voiced opposition through social media, open letters, and collective action. Paradoxically, some initially trusted anti-corruption institutions have come to be perceived as instruments of power threatening social cohesion and political unity. These developments highlight the necessity of balanced anti-corruption approaches grounded in legal principles and democratic values.

Corruption control plays a pivotal role in enhancing the effectiveness of government expenditure (GE) toward educational outcomes (EG) (d'Agostino et al. 2016; Hodge et al. 2011; Nguyen & Bui, 2022). From a good governance perspective, oversight aims to strengthen transparency and accountability. Excessive oversight can generate counterproductive bureaucratic barriers, particularly detrimental to education as a foundation for sustainable development. These barriers adversely affect access and quality of education, ultimately impeding progress toward SDG 4.

Empirical evidence also supports significant correlations among education budgeting, SDG 4 achievement, and corruption control effectiveness. Alfarizi et al. (2024) stress that improving education quality in Southeast Asia, including Indonesia, is vital for achieving the SDGs. Sisto et al. (2020) found that approximately 30.7% of budget initiatives significantly contributed to SDG 4. However, low absorption rates and uneven budget distribution—reported by Wahyudin and Dindin (2018) are often attributed to inefficient regulations and complex bureaucratic procedures. Rahman and Hardiyanto (2022) also observed that despite ongoing bureaucratic reforms, local governments face persistent challenges in addressing corruption and enhancing implementation capacity.

Oversight by institutions such as the Corruption Eradication Commission (KPK) and other anti-corruption units remains essential to ensuring transparency and accountability. However, legislative reforms must be strengthened to prevent oversight mechanisms from becoming impediments. Enhancing institutional accessibility and inter-agency coordination is crucial (Siagian & Fahrizal, 2024). Moreover, education itself serves as a long-term strategy for corruption prevention. Munteanu et al. (2024) highlight the importance of educational approaches that develop cross-sectoral competencies in assessing and combating corruption, including fostering critical thinking within professional education.

Given the complexity of current risk environments, internal audit functions must strategically contribute through risk-based methodologies. Aligning internal audits with development objectives can enhance control systems, governance, and risk management within local governments (Anugraheni, Setiawati, & Trisnawati, 2022). Effective budget management requires disciplined execution, consistent absorption, and clear prioritization. Timely regional budgets (APBD) and disciplined spending support regional expenditure efficiency. Furthermore, transparency, public accountability, and the utilization of information technology such as SiPecel and E-Monev platforms (Romdon, 2020) strengthen real-time budget monitoring.

In conclusion, adaptive, risk-based corruption control combined with disciplined and participatory budget management is fundamental to sustainably optimizing SDG 4 achievement. This balanced approach fortifies governance and ensures that anti-corruption efforts do not impede progress within the education sector.

CONCLUSION

This study aims to examine the relationship between education function expenditure and the achievement of Sustainable Development Goal (SDG) 4 on education in Indonesia, with the Corruption Control Effectiveness Index (CCEI) serving as a moderating variable. The results of the analysis indicate that the education budget significantly contributes to the achievement of SDG 4 targets. Before considering corruption control, the control mechanisms positively enhance the effectiveness of education budget utilization. However, when excessive corruption control is applied, it was found that overly strict and bureaucratic controls weaken the effectiveness of the education

budget in achieving SDG 4 goals. This suggests that rigid oversight mechanisms limit flexibility in budget use, thereby hindering the optimization of funds allocated to the education sector. These findings emphasize the importance of designing adaptive and efficient corruption control systems. Approaches such as Risk-Based Internal Audit (RBIA), which focus supervision on key risk areas, and performance-based fund disbursement mechanisms can reduce bureaucratic burdens while maintaining accountability and transparency. Therefore, effective corruption control must strike a balance between preventing budget misuse and providing flexibility so that education funds can be optimally utilized to support the achievement of SDG 4 by 2030.

Moreover, this study highlights various challenges in the governance of education budgets in Indonesia, particularly related to inefficient regulations and cumbersome bureaucracy that contribute to low budget absorption rates and uneven distribution at the regional level. Consequently, bureaucratic reform and strengthening of supervisory institutions such as the Corruption Eradication Commission (KPK) are critical to enhancing transparency and accountability in regional financial management. The development of risk-based internal audit functions and the utilization of information technology in budget management also represent strategic steps to improve governance and support more effective budget implementation. Scientifically, this research contributes by empirically linking education budgets, corruption control effectiveness, and SDG 4 achievement. The findings complement existing literature on governance and public budget management by highlighting the crucial role of corruption control, which must be strong but also adaptive, and efficient. Practically, the study recommends that policymakers develop more flexible and risk-based supervision systems, enabling the education budget to be maximized without being hindered by excessive bureaucracy.

Key recommendations from this study include developing adaptive oversight systems through implementing Risk-Based Internal Audit, adopting performance-based fund disbursement mechanisms, improving regulations, accelerating bureaucratic reforms at the regional level, and expanding information technology for real-time budget monitoring. Furthermore, future research is strongly encouraged to involve broader data coverage, including other SDG sectors and longer timeframes, to obtain a more comprehensive understanding of the impact of corruption control on achieving sustainable development goals. This study's limitations lie in the use of data solely from district/city governments for the period 2021–2022 and a focus limited to the education function within SDG 4. As a result, the findings may not fully represent conditions at the provincial or national levels or in other SDG sectors. Additionally, the quantitative approach may be insufficient to capture the more complex qualitative aspects of bureaucratic mechanisms and corruption control. Therefore, developing more holistic methodologies and incorporating qualitative data in future studies are highly recommended.

ACKNOWLEDGMENT

This research was conducted with the full support of the Faculty of Economics and Business, Universitas Tadulako. We would like to express our highest appreciation and sincere gratitude for the assistance of funding and the provision of various facilities and resources that greatly contributed to the successful completion of this study. This support facilitated the research process and reflects the Faculty's strong commitment to advancing scientific knowledge and academic research within Universitas Tadulako. We hope that such support will continue to foster innovation and meaningful contributions to the development of the fields of economics and business in the future.

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