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BUDGET POLITICS IN DISASTER RISK REDUCTION: EVIDENCE FROM LOCAL GOVERNMENTS IN INDONESIA

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ABSTRACT

Regions in Indonesia face high disaster risks due to the country's geological and geographical conditions. The urgency of disaster management has become an increasingly global concern, making it essential to ensure adequate financing to support mitigation efforts and reduce future impacts and losses. This study aims to analyze the role of budgeting across various government functions in mitigating disaster risks. A quantitative approach is employed, using secondary data from provincial, regency, and city governments in Indonesia during the 2018–2022 period. The total sample includes 363 local governments with 1,815 observations. Data were obtained from the National Disaster Management Agency (NDMA), the Ministry of Finance, Statistics Indonesia (BPS), and the Ministry of Home Affairs. Data analysis was conducted using a multiple linear regression model with a random effect approach to examine the effect of budget allocation on the Disaster Risk Index (DRI). The findings show that budgets allocated to public order and safety, economic, environmental, and health functions contribute to reducing disaster risks in Indonesia. Meanwhile, budgets for general public services, culture, tourism and religion, education, social protection, as well as housing and public facilities, do not show a contribution to disaster mitigation. These findings underscore the importance of strengthening budget allocations for functions proven to be effective, as well as the need to evaluate and enhance the relevance of other functions to better support a comprehensive disaster mitigation system. Local governments also need to improve cross-sectoral integration and adopt data-driven approaches in budget planning to sustainably strengthen regional resilience.

Keywords: Disaster Risk Mitigation, DRI, Functional Budget, Local Government

INTRODUCTION

At the global level, various international programs and frameworks have made disaster risk mitigation a focus and priority for all parties, including the Sendai Framework for Disaster Risk Reduction (2015–2030) and the Sustainable Development Goals (SDGs), which demonstrate global commitment to reducing the impact of disasters through improved understanding of risks, strengthened governance, and enhanced capacity and preparedness. Indonesia is one of the countries with the highest disaster risk in the world (Riyanti Djalante et al, 2017). According to the 2023 World Risk Report, Indonesia is the second most disaster-prone country globally. Situated along the Pacific Ring of Fire, it is home to 127 active volcanoes, and Indonesia's geographical position in the tropical region, as well as the meeting of two oceans and two continents, make the regions in Indonesia vulnerable to high disaster risks (W. Adi et al, 2023).

According to Law of the Republic of Indonesia Number No. 24 of 2007 on Disaster Management and Government Regulation No. 22 of 2008 on Disaster Funding and Assistance Management, disaster mitigation is recognized as a preventive measure aimed at reducing risks. Mitigation is carried out to assess the empirical conditions of disaster-prone areas so that the impacts can be reduced in the event of a disaster. Indonesia's disaster management system is further regulated through supporting regulations, such as Presidential Regulation No. 93 of 2019 on Strengthening and Implementing the Disaster Management System, which enhances the system at the pre-disaster phase (mitigation and preparedness). Other regulations include the Head of BNPB Regulation No. 6 of 2008 on Guidelines for the Use of Standby Funds and Head of BNPB Regulation No. 23 of 2010 on Guidelines for Collecting and Managing Public Funds for Disaster Assistance. However, in reality, the disaster

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management system in Indonesia has not shown favorable results (Syugiarto, 2021), which has caused mitigation efforts to be uneven and unable to reduce casualties and the economic losses of the community in the form of regional infrastructure damage and residential settlements. The sustainability of community resilience is highly determined by the existence of political commitment to provide resources for managing and reducing risks and vulnerabilities to disasters, while also strengthening resilience. The lack of political commitment is often considered one of the obstacles for countries in prioritizing efforts to reduce hazards and mitigate risks, both in the short term and the long term (Lassa et al, 2019). Therefore, greater emphasis must be placed on allocating disaster management funds at the regional level to enhance resilience and improve risk management effectively.

The budget is closely related to the political process, which is known as budget politics, where its formulation at the local level is often influenced by local political dynamics that may not align with national priorities (David et al, 2024). This is in line with the research of Kahar et al., (2023), which states that organizations will behave and carry out activities according to the expectations of stakeholders. Substantively, budget politics reflects the interaction among political actors with diverse interests in formulating the state budget policy. This process not only regulates how to obtain, manage, and distribute public funds effectively but also demonstrates the tug-of-war of interests and compromises among parties. Thus, the budget functions not only as a technical financial instrument but also as an arena of political competition that determines development priorities, the distribution of welfare, and opens opportunities for improving public services, as well as potential irregularities if oversight is weak (Soeparno, 2022). Economic and political influences shape budget policy-making, often involving tensions among technical, financial, and political priorities (von Hagen & Harden, 1995). This dynamic becomes increasingly important in budget management related to disaster risk mitigation. One form of its implementation is the budget used to mitigate disasters, which is then considered important (Mutiarni et al, 2021). Contingency funds are reserves allocated by the government, both at the central and regional levels, to address emergencies or unforeseen events. These funds include allocations for preparedness before a disaster and emergency funds used during disaster response. However, in risk management, budgeting faces a high level of uncertainty, with the possibility of shortages or deviations in allocations, especially when facing large-scale disasters with widespread impacts (Haris et al, 2023). Disasters can result in significant changes in public budget planning, reduce state revenues, and increase financing needs for the economic and social sectors. Therefore, budget allocation is considered to have a significant impact and influence in mitigating disasters in Indonesia.

In relation to this, research has been conducted to analyze the relationship between government budgets and disaster mitigation efforts in Indonesia. Some of these studies, such as (Haris et al, 2023), revealed that DRI significantly influences the budgeting for local emergency response funds and has served as a foundation for allocating funds for disaster management; however, its application remains restricted to local emergency responses, particularly concerning the implementation budget. Research by (H. Fahlevi et al, 2019) shows that disaster budgeting (DB) shows a strong positive relationship with the total budget of local governments and DB. The finding suggests that DB is designed in accordance with the overall financial resources allocated by local governments, rather than on disaster risk levels or population size in districts. Putra & Matsuyuki (2019) found that decentralization plays a beneficial role by allowing local governments to develop and implement disaster management regulations tailored to their specific needs, both in preparation for and response to disasters, expanding potential budget contributors, and increasing disaster management budgets. Further research by Miao et al (2020) stated that natural disasters increase total government expenditures at the provincial level and transfers from the central government. The study by Fadillah et al (2020) highlights the role of the government in disaster mitigation but does not delve deeply into how budgets can be allocated to support these initiatives. Research by Anggriani et al (2024) found that disaster risk impacts the financial management performance of local governments. Although disaster risk mitigation has been widely studied, there remains a gap in the comprehensive analysis of all government budget functions, particularly at the local level. Previous studies have tended to be limited to examining the correlation between budgeting and disaster risk without covering the full range of budget functions. In fact, in the context of Indonesia with its complex geographical, social, and institutional challenges a holistic approach is highly necessary. This study addresses that gap by analyzing all types of government function budgets and examining the extent to which they contribute to disaster risk mitigation. Given the cross-sectoral nature

of disasters, this approach is crucial to promoting the integration of local budget policies with disaster risk management in a more strategic and coordinated manner.

To answer the research question, the researcher used panel data from local governments covering Provinces/Regencies/Cities in Indonesia over the period 2018–2022, with a total of 1,815 observations. Based on these data, the research findings indicate that several types of government function budgets have an influence on disaster risk mitigation, including budgets for public order and safety, economic affairs, environmental protection, and health functions. These findings provide empirical contributions in expanding the understanding of the relationship between local government budgeting and disaster mitigation efforts, while also reinforcing the results of previous studies. The novelty of this research lies in its comprehensive approach, namely by analyzing all types of government function budgets, thereby revealing budgeting patterns that support disaster mitigation and prevention strategies at the local government level in Indonesia.

Based on the explanation above, it can be concluded that functional budgets have an impact on the Disaster Risk Index (DRI) in Indonesia. The main limitation of this study is that it only uses data from provincial, city, and regency governments during the 2018–2022 period, involving a total of 363 local governments. In addition, this study focuses solely on budgets allocated to government functions. This article is organized into four sections. The second section discusses the literature review and hypothesis development, the third section reviews the research methods applied, the fourth section presents the results of hypothesis testing, and the fifth section provides the conclusion, research implications, limitations, and suggestions for future research.

Literature Review and Hypotheses Development

Management Risk Theory

Risk management involves recognizing, evaluating, and ranking potential risks, followed by the strategic allocation of resources to reduce, oversee, and control their adverse effects. This approach consists of essential stages, including identifying risks, analyzing them, implementing mitigation strategies, and continuously monitoring and reviewing potential threats. (Saputra et al, 2024). It is a structured and rational process designed to guide decision-making, track potential issues, develop solutions, report risks, and oversee organizational responses to various uncertainties. (As Sajjad et al, 2020).

Hastin Nuraini, (2022) concluded that risk management is how an individual or company manages potential or existing risks with the goal of minimizing problems and addressing them to avoid losses, whether in physical or financial form.

In this study, risk management theory provides the conceptual foundation for understanding how local governments should structurally identify, assess, and manage disaster risks. In this context, local budgets serve as a primary instrument in mitigation strategies. This is supported by the findings of (Ahdi, 2015) Who emphasized the importance of shifting the paradigm from reactive disaster response toward a proactive risk management approach integrated into development planning.

Contingency Theory

Contingency theory, particularly as developed by Fiedler (1964), states that the effectiveness of leadership greatly depends on the alignment between leadership style and the situation at hand. This theory emphasizes that there is no single universally effective approach; rather, strategies or policies must be adapted to the characteristics of the environment, organizational structure, and the dynamics of the problems faced (R. Fahlevi et al, 2023). The theory introduced and developed by Fred Fiedler offers a perspective for leaders to make the best possible leadership decisions and organizational resolutions based on the prevailing circumstances (Suntara & Hijran, 2023).

In line with the perspective of contingency theory, Phaup, M., & Kirschner, C. (2010) in their research showed that decision-making in budget policy, especially in facing disasters, cannot be generalized through a single approach in the form of a universal financing model (based on ex ante or ex post) but must be adjusted to the differences in conditions, risk levels, fiscal capacity, and uncertainty faced by each country.

Political Budgeting

The budgetary politics approach introduced by Wildavsky (1964) emphasizes that the public budgeting process is inherently inseparable from political dynamics. Budgeting is not merely a technocratic activity of summing numbers or following formal procedures; rather, it reflects a political arena filled with bargaining processes, compromises, and strategic interests among actors. Wildavsky argues that budgeting is a political process in which the allocation of public resources results from the interaction of various actors with differing interests, thereby affirming the role of the executive as the drafter of the budget and the legislature as the approving body, which highlights the division of authority that influences the direction of public policy (Jones & McCaffery, 1994). In line with this, Blaikie et al. (2004) in At Risk, emphasize that root causes are fundamental factors located at the structural level, embedded within the economic, demographic, and political dynamics of society. These root causes determine who holds power, who owns and can access resources, and who has the authority to make decisions, which ultimately can either increase or decrease the level of societal vulnerability to disasters (St. Cyr, 2005). Thus, public budgeting and disaster risk management are essentially inseparable from power relations, access distribution, and political dynamics that determine the equity of resource distribution.

The Role of Budget Politics in Mitigating Disaster Risks

Budget politics reflects the government's political commitment to disaster risk management. Political dynamics determine how budget decisions are made and how policies are implemented (Santiso, 2007). The disaster management system in Indonesia has stipulated that the allocation of the national budget is to be focused through the National Disaster Management Agency (NDMA), while at the regional level, the Regional Disaster Management Agency (RDMA) serves as the main actor in the planning, implementation, and control of disaster management budgets. (H. Fahlevi et al, 2019). The Sendai Framework 2015–2030 (SFDRR) also emphasizes that proactive planning and investment to prevent future disaster losses and support sustainable development, so that through the political commitment of central and local governments, identification of disaster risks that must be reduced by each local community or country and mobilization of investments to increase resilience must be carried out together with stakeholders (Kawasaki, A., & Rhyner, J. 2018). Effective risk management necessitates increased financial commitment during the pre-disaster phase, focusing on mitigation and preparedness efforts. By doing so, the expenses associated with emergency response and post-disaster recovery can be significantly reduced. Thereby reducing the funds needed for emergency response and recovery (Dartanto et al, 2017). Resource provision, particularly funding, is a key factor in disaster risk reduction (DRR). The success of DRR is determined by consistent national budget allocation, supported by strong governance, adequate human resources, and the government's political will (Coetzee, C., et al. 2022). Thus, the success of disaster risk management depends on the synergy of national policies and the commitment of local governments to support mitigation. Therefore, mitigation budget allocation is crucial to ensuring the government has adequate resources for effective prevention and response to reduce existing risks.

H1. The functional budget has a negative impact on disaster risk.

RESEARCH METHOD

Data

This research focuses on local governments in Indonesia, covering 548 regional entities, including provincial, district, and city administrations, from 2018 to 2022. However, six districts and cities within the Special Capital Region (DKI) Jakarta fall under the jurisdiction of the province's reporting entity and were therefore omitted from the sample. Moreover, among the 548 local governments, data was unavailable for various budget categories: 4 lacked budget data for general public services, 27 for public order and security, 1 for economic functions, 13 for environmental functions, 14 for housing and public facilities, 118 for cultural, tourism, and religious activities, and 2 for social functions. Consequently, due to these data limitations, the final sample size was 363 out of the total local governments in

Indonesia from 2018 to 2022. The sampling was conducted using purposive sampling, with specific considerations. Since the data used spans 5 years, the total final data used is 1,815. The data used is sourced from the Ministry of Finance, the National Disaster Management Agency (NDMA), the Ministry of Home Affairs, and the Central Statistics Agency.

This study employs the multiple linear regression method because it involves more than one independent variable that is presumed to influence the dependent variable. This method is appropriate for the study as the data analyzed are quantitative and aim to statistically test the relationships between variables. Additionally, the estimation model used is the random effect model, as the panel data include multiple entities (local governments) observed over several years. The random effect model is chosen because it is considered capable of capturing random variability across different regions.

Empirical Model and Operationalization of Variables

To address the research problem and test the hypothesis, the empirical model in this study is as follows:

$$DRIskor_{it} = \alpha 0 + \alpha 1 Politicbudget_{it} + \alpha 2 Size_{it} + e \text{……..(1)}$$

The key variables analyzed in this research are DRIskor and $Politicbudget_{it}$. DRIskor represents the Disaster Risk Index and is determined by integrating three components: the hazard index, vulnerability, and local capacity. On the other hand, the politicbudgetit refers to the overall local government budget allocations during the period from 2018 to 2022. This budget encompasses various functions, including public services, public order and security, economic, environmental management, housing and infrastructure, healthcare, culture, tourism, religion, education, and social protection. The financial values for each budget function are expressed using the natural logarithm (Ln).

In this study, the only control variable used is $Size_{it}$. Size is the local government size variable, measured by dividing the total assets of the government by the Gross Regional Domestic Product (GDP). The research variables and data sources are presented in Table 1 below.

Table 1. Operationalization of Variables and Data Sources

Name	Operationalization Variables	Data Sources
$Politicbudget_{it}$	The budget for regional government functions at provincial/district/city levels in Indonesia is measured using (Ln) the natural logarithm of the budget for each function.	Ministry of Finance
$DRIskor_{it}$	The hazard, vulnerability, and capacity index values of an area are combined to assess the capacity listed in the Regional Resilience Indicator for all stakeholders in disaster management in Indonesia. The Indonesian Disaster Management Agency classifies DRI into three categories, namely high (DRI > 144), medium (DRI 13-144), and low (DRI < 13).	National Disaster Management Agency (NDMA)
$Size_{it}$	The size of the regional government is measured by the total assets of the regional government divided by the GRDP.	Central Statistics Agency and Ministry of Finance

Data Source: Processed by Researchers (2024)

ANALYSIS

Descriptive Statistics

Table 2. Statistical Description of Variables

Description	Observation	Mean	Standard Deviation	Min	Max
Budgetpublicservice$_{it}$ *	1.815	780.23	1.443.26	17.04	22.184.32
Budgetsecurity$_{it}$ *	1.815	28.13	124.67	0.05	2.852.90
Budgeteconomy$_{it}$ *	1.815	198.49	508.39	16.34	11.577.22
Budgetenviroment$_{it}$ *	1.815	48.99	277.23	0.06	7.462.67
Budgetpublicfacility$_{it}$ *	1.815	229.73	625.09	0.20	11.941.99
Budgethealth$_{it}$*	1.815	334.18	616.39	38.37	13.660.76
Budgetculture$_{it}$*	1.815	14.74	45.96	0.01	1.140.66
Budgeteducation$_{it}$*	1.815	618.80	1.416.09	50.66	24.061.10
Budgetsocialprotec$_{it}$*	1.815	26.80	121.83	0.03	3.654.85
DRIskor$_{it}$	1.815	142.52	30.95	48.13	223.2
Size$_{it}$	1.815	0.32	0.6901231	0.01	10.89

Number of Observations = 1,815
Explanation of Variable operationalization in table 1
*) In billions of rupiah

Data sources: Secondary data , STATA 17 Output (Processed, 2024)

The descriptive statistics table illustrates all the variables analyzed in this study. The variable Budget public service it shows an average of 780.23, meaning that the average sample used for the public service budget is valued at approximately IDR 780,230,000,000.00. The mean of the variable Budget security is 28.13, indicating that the average sample used for the public order and security budget is around IDR 28,130,000,000.00. The mean of the variable Budget economy it is 198.49, meaning the average sample used for the economic function budget is valued at IDR 198,490,000,000.00. The mean of the variable Budget environment is 48.99, meaning the average sample used for the environmental function budget is around IDR 48,990,000,000.00. The mean of the variable Budget public facility it is 229.73, indicating that the average sample used for the public facilities and housing budget is around IDR 229,730,000,000.00. Next, the variable Budget health shows a mean of 334.18, meaning that the average sample used for the health function budget is approximately IDR 334,180,000,000.00. The mean of the variable Budget culture is 14.74, which means the average sample used for the cultural, tourism, and religious function budget is around IDR 14,740,000,000.00. The mean of the variable Budget education is 618.80, indicating that the average sample used for the education function budget is around IDR 618,801,000,000.00. The mean of the variable Budget social protec it is 26.80, meaning that the average sample used for the social protection function budget is around IDR 26,801,000,000.00.

The mean of the disaster risk index variable (DRIskor$_{it}$) is around 142.522. Therefore, the average sample of local governments in this study has a medium disaster risk level. Meanwhile, the mean of the control variable Size$_{it}$, measured from the total, shows a value of only 0.32.

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Table 3. Correlation Analysis of Variables

	driskor	Budgetpublicservice	Budgetsecurity	Budgeteconomy	Budgetenvironment	Budgetpublicfacility	Budgethealth	Budgetculture	Budgetsocialprotec	Budgeteducation	size
driskor	1.000										
Budgetpublicservice	-0.044 0.0597	1.000									
Budgetsecurity	-0.105*** 0.000	0.331*** 0.000	1.000								
Budgeteconomy	-0.088*** 0.000	0.739*** 0.000	0.234*** 0.000	1.000							
Budgetenvirement	-0.160*** 0.000	0.408*** 0.000	0.551*** 0.000	0.409 0.409	1.000						
Budgetpublicfacility	0.000 0.996	0.307*** 0.000	0.640*** 0.000	0.148*** 0.000	0.410*** 0.000	1.000					
Budgethealth	-0.091*** 0.000	0.763*** 0.000	0.391*** 0.000	0.704*** 0.000	0.531*** 0.000	0.291*** 0.000	1.000				
Budgetculture	-0.064*** 0.006	0.296*** 0.000	0.524*** 0.000	0.177*** 0.000	0.391*** 0.000	0.597*** 0.000	0.297*** 0.000	1.000			
Budgetsocialprotec	-0.084*** 0.000	0.369*** 0.000	0.713*** 0.000	0.228*** 0.000	0.532*** 0.000	0.747*** 0.000	0.378*** 0.000	0.614*** 0.000	1.000		
Budgeteducation	-0.056*** 0.015	0.813*** 0.000	0.440*** 0.000	0.724*** 0.000	0.529*** 0.000	0.359*** 0.000	0.869*** 0.000	0.355*** 0.000	0.419*** 0.000	1.000	
Size	-0.046** 0.046	-0.136*** 0.000	-0.145*** 0.000	-0.166*** 0.000	-0.207*** 0.000	-0.050** 0.031	-0.268*** 0.000	-0.0429 0.068	-0.053** 0.021	-0.340*** 0.000	1.000

Number of Observations = 1.815
Explanation of Variable operationalization in table 1
* * * , * * = P value is significant 1%, 5%

Secondary data, STATA-17 output (Processed, 2024).

The correlation analysis table presents information about the relationships or connections between two or more variables in the study. Table 3 shows that all the main variables in this study, such as the budget function variables and DRI (Disaster Risk Index), have significant correlations with each other. However, the budget for general public services (Budgetpublicservice) does not have a correlation or is not related to the DRI.

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Hypothesis Testing

Hypothesis testing in this study was conducted using the multiple linear regression method and the random effect model with the STATA-17 software or testing tool. The results of the testing can be seen in Table 4 below.

Table 4. Result Hypothesis Testing

Variables$_{it}$	***DRIskor$_{it}$***									
	Panel A.	**Panel B.**	**Panel C.**	**Panel D.**	**Panel E.**	**Panel F.**	**Panel G.**	**Panel H.**	**Panel I.**	**Panel J.**
_CONS	208.58 (0.000)	218.95 (0.000)	241.95 (0.000)	252.09 (0.000)	144.41 (0.000)	282.37 (0.000)	177.49 (0.000)	227.96 (0.000)	196.00 (0.000)	270.99 (0.000)
Budgetpublicservice$_{it}$	-2.413** (0.030)									3.454 (0.217)
Budgetsecurity$_{it}$		-3.238*** (0.000)								-2.549** (0.022)
Budgeteconomy$_{it}$			-3.858*** (0.000)							-3.112** (0.049)
Budgetenviroment$_{it}$				-4.607*** (0.000)						-3.748*** (0.000)
Budgetpublicfacility$_{it}$					-0.047 (0.925)					3.361*** (0.000)
Budgethealth$_{it}$						-5.286*** (0.000)				-4.460** (0.044)
Budgetculture$_{it}$							-1.515*** (0.005)			-0.859 (0.180)
Budgeteducation$_{it}$								-3.160*** (0.001)		3.451 (0.121)
Budgetsocialprotec$_{it}$									-2.268*** (0.001)	-1.464 (0.188)
Size$_{it}$	-2.450** (0.030)	-2.889*** (0.000)	-3.882*** (0.000)	-3.809*** (0.000)	-2.136*** (0.003)	-3.501*** (0.000)	-2.261*** (0.002	-3.406*** (0.000)	-2.344*** (0.002)	-3.843*** (0.000)
Prob > F	0.001	0.000	0.000	0.000	0.013	0.000	0.000	0.000	0.000	0.000
Adj R-Squared	0.004	0.015	0.011	0.032	0.002	0.013	0.006	0.008	0.009	0.051
Mean VIF	1.02	1.02	1.03	1.04	1.00	1.08	1.00	1.13	1.00	3.05

Number of Observations = 1.815
Explanation of Variable operationalization in table 1
** * *, * * = P value is significant 1%, 5%*

Secondary data, STATA-17 output (Processed, 2024)

In Table 4, Panel A shows that the budget for public service functions has a negative effect on DRI score in mitigating disaster risks, with a coefficient of -2.413, significant at the 5% level. Panel B shows that the budget for order and security function also has an impact on disaster risk mitigation, with a coefficient of -2.328 and significance at the 1% level. Panel C shows that the economic function budget has a coefficient of -3.858, with very high significance at the 1% level. Panel D shows that the environmental function budget has a significant effect on DRI at the 1% level with a high coefficient of -4.607. Panel E shows that the budget for housing and public facilities does not have an effect on DRI with a coefficient of -0.047. Panel F shows that the health function budget has a very significant negative effect on disaster risk mitigation, with a significance level of 1% and a coefficient of -5.286. Panel G shows that the budget for culture, tourism, and religion has a coefficient of -1.515 and impacts DRI with significance at the 1% level. Panel H shows a coefficient of -3.160 with significance at the 1% level. Panel I shows that the budget for social protection functions has an impact on DRI with a coefficient of -2.268 and significance at the 1% level.

In Panel J, the testing conducted together shows that functional budget variables such as order and security function (Budgetsecurity), economic functions (Budgeteconomy), environmental functions (Budgetenviroment), and health functions (Budgethealth) have a negative effect on the disaster risk index with coefficients of -2.549, -3.112, -3.748, and -4.460, significant at the 5% and 1% levels. Meanwhile, the budget for housing and public facilities shows a positive effect with a coefficient of 3.361 and significance at the 1% level. Public service, culture, tourism and religion, education, and social protection budgets do not have an effect on DRI with coefficients of 3.454, -0.859, 3.451, and -1.464.

The results in Table 5 show that several budget functions have a significant and consistent impact on the DRI score variable, including the order and security function budget (Budgetsecurityit), the economic function budget (Budgeteconomyit), the enviromental function budget (Budgetenviromentit), and the health function budget (Budgethealthit). This evidence supports the hypothesis that functional budgeting impacts disaster risk.

DISCUSSION

Based on the hypothesis testing results in Table 4, it is shown that the functional budgets that consistently influence the DRI, such as the law and order function (Budgetsecurity), economic function (Budgeteconomy), environmental function (Budgetenvironment), and health function (Budgethealth), hurt the disaster risk index. In this study, the functional budgets with a negative effect are interpreted as meaning that if the budget for these functions increases, the disaster risk index can be mitigated. These results are in line with the findings of Haris et al (2023), who state that the DRI affects disaster emergency budgeting in local governments in Indonesia, as well as the study by (Putra & Matsuyuki, 2019), which shows that decentralization affects the implementation of disaster management in Indonesia in terms of budgeting. Other research by Coetzee et al (2022) Found that local governments are required to include DRR (Disaster Risk Reduction) and related activities in their planning and allocate appropriate budgets. The analysis by Cvetković et al., (2021) also found that there is a relationship between local government budgeting for DRM (Disaster Risk Management) and local government preparedness.

Meanwhile, for functional budget variables such as the general public services budget (Budgetpublicservice), housing and public facilities budget (Budgetpublicfacility), culture, tourism, and religion budget (Budgetculture), education budget (Budgeteducation), and social protection budget (Budgetsocialprotec), do not consistently influence disaster risk mitigation. This indicates that the data used in this study does not have a significant impact on the disaster risk index.

These functions, which do not currently demonstrate an impact, have not explicitly incorporated disaster mitigation components into their planning. Another reason is that local governments do not prioritize disaster mitigation in certain budget functions. This can result in a lack of mainstreaming of disaster mitigation across various budget sectors. Due to the unpredictable nature of disasters, most local governments tend to show less interest in mitigation and preparedness efforts. Local governments are more inclined to allocate larger resources for emergency response and post-disaster recovery (Dartanto et al, 2017). Mirjas et al, (2021) emphasize that disaster budget management in Indonesia is still ineffective and inefficient due to conventional and overlapping budgeting mechanisms, as well as

the absence of a performance evaluation system for fund-managing agencies. This weakness is exacerbated by the low political commitment of the government to make disaster mitigation a budget priority, both at the national and regional levels. As a result, efforts for disaster prevention and risk reduction have not received adequate attention in the budget policy formulation process.

Some of the mentioned budgets have relatively high allocations, such as the general public services and education functional budgets. However, these allocations are not effectively used for activities that support disaster risk mitigation. For example, the general public services budget is more focused on public administration and services to the public, while the education budget is more centered on school infrastructure development rather than curriculum development or disaster mitigation training. The study conducted by Dewanggajati & Djamaluddin, (2021) revealed that the presence of disaster management agencies at the regency/city level, as well as educational institutions in the region, significantly contributes to community involvement in disaster training or simulations at the household level as part of disaster risk reduction (DRR) efforts. However, the level of participation remains relatively low, indicating the need for stronger synergy between the education sector and disaster management agencies.

The findings of this study regarding the housing and public facilities budget are inconsistent with research by Etinay et al., (2018); Palliyaguru & Amaratunga, (2008); Dartanto et al., (2017) , who argue that infrastructure resilience is key in minimizing disaster losses. This discrepancy may be due to the allocation of this budget being more focused on new infrastructure development or the expansion of residential areas rather than preventive efforts related to disaster risk. Infrastructure development can potentially increase disaster risk if it does not consider long-term factors and ignores environmental aspects. Such development may also encourage rapid urbanization in a region and create population density, which could exacerbate disaster risk. Tselios & Tompkins, (2020); Ishiwatari & Surjan, (2019) also stated in their research that higher population density increases the likelihood of a country experiencing disasters. The analysis by Mawaddah Rahmah, et al (2025) states that although the Indonesian government has made efforts to manage disaster risks, the implementation of its policies is often influenced by political and economic interests that dominate budget priorities. For example, in large-scale infrastructure development such as dams and toll roads, disaster mitigation considerations are often overlooked, resulting in subsequent impacts such as flooding caused by uncontrolled land-use conversion.

Another finding related to the education budget is that disaster mitigation needs to be integrated into the education sector because Indonesia is a disaster-prone country, and education can be a means of instilling positive values, including awareness and disaster mitigation actions (Baytiyeh, 2018). Research by Tselios & Tompkins, (2020) also revealed that higher educational achievement reduces the likelihood of a country experiencing disasters. Therefore, incorporating disaster mitigation education into the school curriculum can be a long-term investment that not only helps reduce disaster impacts but also prepares society to face increasingly complex challenges in the future. Furthermore, regarding the social protection budget, Rana et al., (2022) Noted that social protection is increasingly seen as a means to reduce vulnerability to disaster risks and enhance adaptation to climate change. However, the concept of social protection is still in development, especially in the context of disasters. In Indonesia, the allocation of the social protection budget primarily focuses on emergency aid and recovery during the post-disaster phases. The budget for disaster mitigation is generally still smaller than the funds allocated for post-disaster response, resulting in policies that tend to be reactive rather than preventive. In addition, relocation programs often overlook the socio-economic conditions of affected residents, triggering new problems such as poverty and unemployment (Mawaddah Rahmah, et al 2025). It is not uncommon for areas with strong political influence to be prioritized in mitigation funding, while remote and vulnerable regions are often neglected (Budiman et al, 2024). However, a more comprehensive approach is needed, one that includes mitigation measures before disasters occur and efforts to enhance the resilience of communities in disaster-prone areas.

From the above explanation, it is evident that budget allocation for certain functions has not been effective in reducing disaster risk due to the lack of integration of DRR into planning and budgeting, low allocation at the regional level, and limited community participation in training and simulations. Sunarharum, (2020) emphasized the importance of integrating a collaborative approach into existing systems and mechanisms. emphasizes the need for a collaborative approach involving authorities, NGOs, and community leaders to maintain communication and coordination among stakeholders, so

that DRR budget planning becomes more inclusive, responsive, and sustainable in terms of funding and program implementation. This collaboration is crucial because each actor depends on one another for capacity building and resource fulfillment (Prawestari, 2021).

Regarding the theories used, risk management theory in the context of disasters aims to help organizations or governments develop strategies, identify risks, and prioritize to reduce the likelihood of hazards or the impacts of potential disasters. Meanwhile, from a contingency theory perspective, the emphasis is on adaptability and flexibility in dealing with various situations. The effectiveness of an approach depends on specific conditions, such as environmental characteristics, the type of risk, and available resources. The combining of these two theories emphasizes that functional budgets for disaster mitigation must be developed in an adaptive, risk-based manner, taking into account long-term sustainability and preparedness for changing situations.

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SENSIVITY TESTING

Sensivity testing is conducted to evaluate the extent to which the results of the study are influenced by changes in certain variables or assumptions. In Table 5, sensivity testing is carried out. The sensivity test is performed using the DRI variable, which is assessed with a dummy for the DRI category, "1" for high DRI scores and "0" for other categories. This test is conducted using a 'logit' or logistic regression. The following are the findings from the sensivity testing presented in the table.

Table 5. Results of Sensivity Testing

Variables$_{it}$	***DRId$_{it}$***									
	Panel A.	**Panel B.**	**Panel C.**	**Panel D.**	**Panel E.**	**Panel F.**	**Panel G.**	**Panel H.**	**Panel I.**	**Panel J.**
_CONS	1.921 (0.323)	2.785 (0.006)	2.248 (0.140)	5.228 (0.000)	-0.529 (0.508)	7.162 (0.00)	1.059 (0.176)	4.741 (0.005)	1.337 (0.145)	4.882 (0.026)
Budgetpublicservice$_{it}$	-0.072 (0.311)									0.254 (0.092)
Budgetsecurity$_{it}$		-0.121*** (0.005)								-0.096 (0.165)
Budgeteconomy$_{it}$			-0.089 (0.131)							0.108 (0.274)
Budgetenviroment$_{it}$				-0.223*** (0.000)						-0.222** (0.000)
Budgetpublicfacility$_{it}$					0.019 (0.547)					0.161*** (0.003)
Budgethealth$_{it}$						-0.273*** (0.000)				-0.283 (0.064)
Budgetculture$_{it}$							-0.049 (0.156)			-0.030 (0.516)
Budgeteducation$_{it}$								-0.178*** (0.004)		-0.118 (0.433)
Budgetsocialprotec$_{it}$									-0.059 (0.131)	0.007 (0.919)
Size$_{it}$	-0.053 (0.422)	-0.072 (0.285)	-0.061*** (0.000)	-0.131 (0.045)	-0.040 (0.533)	-0.119 (0.089)	-0.047 (0.464)	-0.119 (0.098)	-0.049 (0.458)	-0.215*** (0.006)
Prob > chi2	0.473	0.014	0.249	0.000	0.674	0.000	0.286	0.012	0.256	0.000
Pseudo R2	0.000	0.003	0.001	0.011	0.000	0.005	0.001	0.003	0.001	0.020

Number of Observations = 1.815
Explanation of Variable operationalization in table 1
* * * , * * = P value is significant 1%, 5%

Source: Secondary data, STATA-17 output

The results of the testing show that the variables are able to explain the DRId with functional budgets, significant at the 1% and 5% levels. As seen in Table 5, only one functional budget consistently affects the DRI, which is the environmental function budget, and it has a negative and significant impact. These results suggest that environmental management policies should be strengthened through larger budget allocations and the implementation of environment-based programs. This is because effective environmental management, such as ecosystem preservation, reforestation, and preventing environmental damage, can reduce disaster risks. Faivre et al (2018) Revealed a close connection between disaster risk reduction and the environment, which has been widely acknowledged, with the frequency of natural disasters further clarifying this relationship.

CONCLUSION

The main aim of this study is to analyze the role of regional functional budgets in disaster risk mitigation. The research findings indicate that not all functional budgets contribute to disaster risk mitigation. This suggests that functional budget allocation to the disaster risk index is ineffective, even though Indonesia faces a high disaster risk. Therefore, budgeting orientation remains more administrative than disaster risk-based.

These findings emphasize the importance of reorienting regional budgeting policies toward a disaster risk-based approach. The government needs to prioritize budget functions proven effective in supporting mitigation and reevaluate those that do not significantly contribute to reducing the Disaster Risk Index. Budget responsiveness can be improved, for example, by strengthening strategic functions, particularly education to instill disaster preparedness values, social protection to build the capacity of vulnerable groups, designing public facilities based on disaster resilience, and utilizing the cultural, tourism, and religious sectors as channels for disseminating mitigation information based on local wisdom. Furthermore, public services need to support early warning systems, risk data centers, and responsive emergency health services. Disaster risk-sensitive budgeting requires synergistic cross-sectoral coordination, policy harmonization, and strong political commitment to ensure that budget allocations truly strengthen regional disaster resilience.

This study is limited by its data coverage, which covers only the 2018–2022 period, is limited to the provincial, district, and city levels, and focuses solely on budgets based on government functions. The aggregate approach also does not account for variations in the specific characteristics of disaster-prone areas. Future research is expected to expand the research period to capture broader dynamics and examine other budget functions, budget function realization, and consider other variables related to the disaster risk index. Future research could also consider approaches that account for geographic differences and local characteristics, such as areas prone to earthquakes, floods, or landslides, for more contextual analysis, and combine quantitative approaches with qualitative studies to explore political dynamics and local considerations in budget decision-making.

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