Sustainable budget allocation strategy in supporting SDGs environmental pillar in Malang City, Indonesia

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ABSTRACT

Sustainable Development Goals (SDGs) consist of three pillars: economic, social and environmental. It has been observed that the environmental pillar in Malang City has declined, while the economic and social pillar have increased, indicating that economic and human activities in general have a big influence on reducing environmental quality. This research focuses on evaluating sustainable budget allocation strategies that support the environmental pillar. Budget efficiency analysis was used to assess SDGs achievement in Malang City from 2019 to 2022. Based on the calculation results of this research, Malang City's budgeting efficiency was in the "very poor" category during the 2019-2022 period. It was also observed that the best budget allocation strategy occurred in 2022. In addition, this research shows that the budget allocation strategy is sorted based on the immediacy of need into four budget allocation priorities. The priority grouping can be used as a sustainable budget allocation strategy, especially in the event of limited budget. From a socio-economic point of view, government policy is also a contributing factor with a negative impact on the environment. Therefore, it is hoped that the sustainable budget allocation strategy can serve as a solution to continue paying attention to and improve environmental quality while growing the economy.

INTRODUCTION

Economic development is an important milestone in efforts to improve community welfare in a sustainable manner. Sustainable economic development is the main focus in carrying the vision of increasing the per capita income of the population and ensuring survival and prosperity without sacrificing human rights and the principle of equality. Adopted by the UN in 2015, the global agreement in the 2030 Agenda for Sustainable Development sets out 17 global goals aimed at promoting peace and prosperity. The Sustainable Development Goals explore more deeply how sustainable economic development can be implemented effectively by integrating aspects of human rights and equality (Yimbesalu et al., 2019). With the increasing issue of climate change resulting in a drastic decline in environmental quality, how can this be improved? According to Nikensari et al. (2019), global research on this issue highlights that unsustainability in each country's economic activity is the main source of current negative externalities.

The World Meteorological Organization (WMO) states that CO_2 is the main cause of global warming.

CO2 emissions have increased sharply in the last century due to human activities, especially the use of fossil fuels such as coal, oil and gas, manufacturing activities, transportation, and consumption of goods and services directly related to economic growth. Therefore, there is a systematic relationship between economic growth and environmental quality known as the environmental Kuznets curve (EKC) which forms an inverted U curve. In Malang City, the economic growth and CO2 emissions caused by population activities are presented in Table 1.

Table 1. GRDP per Capita and CO2 Emissions of Malang City in 2010-2022

Year	PDRB per Capita*	CO2 Emissions
	million rp	ton
2010	38.25	283476.0
2011	40.16	286326.5
2012	42.37	288412.5
2013	44.66	290581.5
2014	46.96	292368.3
2015	49.28	294208.6
2016	51.73	295975.3
2017	54.36	297704.7
2018	57.15	299330.4
2019	60.11	300907.7
2020	60.62	291620.7
2021	63.09	292008.8
2022	66.99	292421.1

*at constant price

Source: BPS and Environmental Service (processed)

The above figures show that Malang City was achieving high economic growth during the period which caused environmental degradation as the increase in GRDP per capita resulted in an increase in CO2 emissions. In realizing sustainable development, it is therefore necessary to find ways to reduce CO2 emissions to ensure that a turning point can immediately occur in achieving high GRDP without ignoring existing environmental aspects (Ko et al., 2019). One way to reduce CO2 emissions is to channel the budget efficiently to reduce environmental pollution (Jiang et al., 2020).

Economic growth and environmental sustainability are equally important, which is in line with the Millennium Development Goals (MDGs) ended in 2015 and subsequently replaced with the Sustainable Development Goals (SDGs) started in 2016. The main target is to combine the principles of sustainable development with national policies and development and restore lost environmental resources (Jiang et al., 2020). The indicator used to measure the success of this target is CO2 emissions. This means that the government must implement sustainable development to ensure environmental sustainability in the present and future.

It is widely recognized that sustainable development carries three dimensions, namely the economic dimension (economic pillar), the social dimension (social pillar), and the environmental dimension (environmental pillar) (Muscalu et al., 2016). The economic pillar is represented by the GRDP growth rate, the social pillar is represented by the Human Development Index (HDI), while the environmental pillar is depicted by the Regional Environmental Quality Index (IKLHD). In Malang City, the GRDP growth rate and HDI have increased, while the IKLHD has decreased. During the COVID-19 pandemic in 2020, Malang City experienced a significant economic contraction with economic growth of -2.07%. However, in 2021 and 2022, the economy began to recover with growth of 4.21% and 6.32%, respectively. Despite the economic contraction in 2020, the HDI continued to increase from 81.32 in 2019 to 81.45 in 2020 and continued to rise to 82.71 in 2022, demonstrating government's efforts in maintaining quality education, health and living standards despite the pandemic. On the other hand, the IKLHD experienced sharp fluctuations, with a significant increase in 2020 (75.54) compared to 2019 (65.27), but followed with a decrease to 56.31 in 2022. This shows that challenges the environment remained, although there were improvements in 2020. In general, Malang City demonstrated resilience in the human development aspect even though it faced economic and environmental challenges.

In reducing environmental pollution and achieving sustainability, the country needs to increase the budget for programs that support these goals and efficient distribution of the allocated budget is critical to achieving these goals. (Cartea et al., 2022). It is estimated that development gaps will remain in 2030 in each country and between indicators. Most government spending is insufficient to close the SDGs gap, even when countries implement budget constraints to meet existing government programs. Therefore, micro policies are necessary to overcome long-term structural obstacles and improve relevant indicators (Guerrero et al., 2022).

Budgets are recognized as one of the most powerful tools available to governments to encourage contributions, and therefore several initiatives have emerged to align budget items and SDGs performance

(Sisto et al., 2020). Malang City utilizes the Regional Original Tax (PAD) funds to manage the problem of greenhouse gas emissions and has not implemented a special allocation or allocated one type of tax stipulated in the Regional Tax and Regional Retribution Law (Almaghfi et al., 2016). To achieve the SDGs, the Malang City government has carried out various regional policy and innovation efforts, including supporting the universal sanitation access movement through the 100-0-100 program (Akbar, 2018). One of the supporting programs in Malang City is City Without Slums (KOTAKU), namely 100 access points to clean water, 0 slum areas and 100 access points to proper sanitation. KOTAKU aims to improve access to infrastructure and basic services in urban slum settlements to create livable, productive and sustainable settlements (Harjo et al., 2021). In addition, there is a thematic village movement, in which research shows that the development of thematic villages in efforts to overcome urban development problems in Malang City has had a very positive impact on managing the development of the Malang City area (Akbar, 2018). Subdistricts offer strategic potential and unique settlement models need to be managed well, on par with other settlements as part of national development, including through sustainable tourism (Purbadi et al., 2019). The SDGs Regional Action Plan (RAD) was prepared by the Malang City Regional Development Planning Agency. Based on the aforementioned background, the plan serves as the basis for conducting research to determine a sustainable budget allocation strategy in supporting the environmental pillar using a budgeting allocation approach in Malang City. This research aims to analyze the efficiency of budget use in supporting the achievement of SDGs environmental goals and indicators in Malang City during a selected period. By understanding the general description of the research object, it is hoped that the research provides deeper insight into sustainable budget management for environmental development at the regional level.

RESEARCH METHOD

This research was conducted in Malang City, East Java Province, Indonesia. The study included data during the 2019-2022 period. The study focused on the environmental pillars in the SDGs which have been mapped to the Malang City RPJMD indicators for 2018-

2023. The research began with problem selection that focused on budget allocation strategies to support the SDGs environmental pillars in Malang City. A literature review was conducted to establish the theoretical foundation and review relevant previous research. Data identification and collection prioritized relevant secondary data. The initial analysis evaluated the condition and position of Malang City using the environmental Kuznets curve (EKC) concept, with a focus on the relationship between Gross Regional Domestic Product (GRDP) per capita and CO2 emissions. An efficiency analysis was subsequently carried out to assess the performance of the Malang City Government in achieving environmental pillar output based on budget realization and output volume achievements. The analysis results would form the basis for preparing technical policy recommendations to support sustainable development in Malang City.

This research utilized quantitative and qualitative methods with secondary data analysis. Secondary data included related regulations, study reports, planning documents and sectoral statistical data, while data sources included: (i) Government Agency Performance Accountability Report (LAKIP); (ii) Budget Realization Report (LRA); (iii) Strategic Plan (Renstra); and (iv) Data from Malang City Finance and Assets Services, Environmental Services, Planning and Development Agency, Disaster Management Agency, Civil Service Police Unit, Transportation Services, Education and Culture Services, and the Statistics Agency.

This research was conducted in Malang City using data from 2019 to 2022 regarding the SDGs environmental pillars whose goals, targets and indicators have been mapped to the Malang City RPJMD indicators for 2018-2023. From the mapping, it is observed that Malang City implements the SGDs environmental pillars with 5 (five) goals and 28 indicators (Table 2).

Performance evaluation is a process of measuring or assessing performance achievements, both in terms of performance achievements and the costs of achieving them. The results of the performance evaluation are used as a component in the budgeting process in subsequent years. In this research, the performance evaluation refers to the measurement and assessment stage of the previous year's budget implementation, the results of which would be used as the basis for preparing the following year's budget.

Table 2. Goals and Indicators of Malang City's SDGs Environmental Pillar

Objective	Indicator
Goal 6: Clean Water and Adequate Sanitation	1. Residential homes that have access to clean water 2. Residential homes that have adequate sanitation facilities/access 3. City irrigation in good condition 4. Water availability through the provision of storage buildings
Goal 11: Sustainable cities and human settlements	1. Healthy and safe environments supported by PSU; 2. Accessible and affordable housing services; 3. Handling housing infrastructure; 4. Houses uninhabitable; 5. Handling slum areas; 6. Land transportation services (number of land transportation/number of land transportation passengers); 7. Public transportation KIR ownership; 8. Preservation of diversity and cultural richness that is fostered; 9. Increase in the active traditional arts institutions; 10. Increase in the historical perpetrators; 11. Increase in museum visitors; 12. Cultural heritage preserved; 13. Disaster-resistant communities; 14. Average disaster response time; 15. Disaster victims who received logistical assistance; 16. Infrastructure damage handled after the disaster; 17. Disaster victims who received social assistance during the emergency response period 18. Waste handling.
Goal 12: Responsible consumption and production	1. Prevention of environmental pollution and/or damage; 2. Business actors who have managed B3 waste; 3. Waste reduction in the community and informal sectors (is a cumulative value) 4. Community compliance and activities/businesses of environmental permit holders
Goal 13: Address Climate Change	Environmental planning documents that are structured and meet standards
Goal 15: Terrestrial Ecosystems	Managed public green open space

The evaluation used the performance evaluation mechanism regulated in PMK No. 249/PMK.02/2011 concerning Performance Measurement and Evaluation of the Implementation of Work Plans and Budgets of State Ministries/Institutions. The performance evaluation in accordance with PMK No. 249/PMK.02/2011 can be used to measure efficiency with the following formula:

$$E = \frac{\sum_{i=1}^{n}\left(1 - \frac{RAK_i/RVK_i}{PAK_i/TVK_i}\right)}{n} \qquad (1)$$

Efficiency is a measure of the efficiency of an activity or project. RAK or Output Realization Budget is a budget that has been realized for the output produced. RVK, or Realized Output Volume, is the output volume that has been achieved. PAK or Output Budget Ceiling is the maximum budget allocated for a particular output. TVK, or Target Output Volume, is the target output volume that is expected to be achieved within a certain time period or project.

Based on this efficiency formula, a cost per unit output formula or cost per output index was developed. If the output cost index had been calculated optimally and determined as standard output cost (SBK), the efficiency was calculated based on the difference between the realized cost per output and the SBK. SBK is the cost required to produce performance (output) with optimal value. The cost index based on output targets and realization was formulated as follows:

$$IBT \ (Target \ Cost \ Index) = \frac{PAK}{TVK} \qquad (2)$$

$$IBR \ (Realized \ Cost \ Index) = \frac{RAK}{RVK} \qquad (3)$$

By using this instrument in accordance with the objectives of PBK implementation, it was hoped to produce cost standards (budgeting allocations) with improved efficiency (Olfah, 2018). The efficiency value was obtained assuming that the minimum value achieved by the Ministry/Institution in the efficiency formula was -20% and the highest value was 20%.

Therefore, it was necessary to transform the efficiency scale to obtain a value scale ranging from 0% to 100% with the following formula:

$$NE = 50\% + \left(\frac{E}{20} \times 50\right) \qquad (4)$$

Efficiency Value (NE) is a value that measures efficiency in a certain context. In the case of Indonesia in 2011, the efficiency value (E) reflects how effectively resources were utilized to achieve the desired results. The efficiency covers various aspects such as energy use, budget allocation, or labor utilization with the aim of maximizing output with minimal input. The efficiency assessment was necessary to identify areas that require improvement and to improve overall performance in various sectors in Indonesia. With a scale between 0% and 100%, the efficiency criteria for the indicator measurement program are presented in Table 3.

Table 3. Program Performance Efficiency Criteria

No	Performance Efficiency Criteria	Realized Value Interval
		%
1	Very good	91 - 100
2	Good	81 - 90
3	Fair/Ordinary	61 - 80
4	Not enough	51 - 60
5	Very less	$\leq$ 50

RESULT AND DISCUSSION

GRDP Growth, HDI and IKLH of Malang City

This research focuses on research objects located in Malang City, a city located in East Java Province, Indonesia. The data used in this research cover the period from 2019 to 2022 with an emphasis on the SDGs environmental pillar. Malang City has mapped the SDGs goals, targets and environmental indicators which have been adjusted to the indicators of the 2018-2023 Malang City Regional Medium Term Development Plan (RPJMD). From the mapping, it was observed that Malang City has implemented the SDGs environmental pillars through five goals and 28 different indicators with the existing conditions.

Table 4 demonstrates that the GRDP growth rate and the HDI values of Malang City increased, in contrast with IKLH values, which shows a decline. However, when the economy experienced a contraction in 2020, the IKLH value increased. This has served as a deep baseline study in observing the

decline in environment quality caused by economic activities in Malang City. Environment quality can be measured through SDGs indicators to maximize effectiveness and efficiency of SGDs indicator targets.

Table 4. GRDP Growth, HDI and IKLH of Malang City 2018-2022

Year	Growth Economy	HDI	IKLH
	%		
2018	5.72	80.89	NA
2019	5.73	81.32	65.27
2020	-2.07	81.45	75.54
2021	4.21	82.04	60.46
2022	6.32	82.71	56.31

Source : Malang City Central Statistics Agency and Environmental Service Life of Malang City, 2023

This research aims to analyze the efficiency of budget use in supporting the achievement of SDGs environmental goals and indicators in Malang City during the research period. By understanding the general description of the research object, it is hoped that the research can provide deeper insight into sustainable budget management for environmental development at the regional level.

Malang City SDGs Pillar Efficiency

In previous research conducted by Aini et al. (2023), IBT, IBR calculations were carried out to calculate efficiency which resulted in budgeting efficiency figures in achieving targets set by Malang City on a scale from -20% to 20% during the period from 2019 to 2022 (Table 5). In this research, the results of IBT, IBR and budget efficiency calculation were used to support the implementation of Malang City's SDGs environmental pillars through efficiency calculations for each goal.

The results show that the best budget allocation strategy during the four years of observation occurred in 2022. Therefore, 2022 can be used as a reference year for budget allocation implementation. From calculating efficiency per environmental pillar goal, it has been observed that Goal 11 (Sustainable cities and settlements) and Goal 13 (Addressing climate change) need to be prioritized in increasing efficiency. Meanwhile, Goal 6 (Clean water and adequate sanitation) and Goal 12 (Responsible consumption and production) would be the next priority. The priority order was based on the aspects with most urgent need for budget allocation. The following are the efficiency

results per the SDGs environmental pillar goals for Malang City in 2022.

Table 5. Efficiency Rate of Malang City's SDGs
            Environmental Pillar in 2022 and 2023

Objective	2022[1]	2023[2]
	……… % ………..	
Goal 6: Clean water and adequate sanitation	16.95	42.88
Goal 11: Sustainable cities and human settlements	0.83	2.57
Goal 12: Responsible consumption and production	21.48	54.21
Goal 13: Address climate change	1.69	4.73
Goal 15: Ecosystem Mainland	34.24	86.09

[1]Source: Aini et al. (2023)
[2]Source: Processed Data, 2024

Table 6 indicates results with scale from -20% to 20%. Therefore, a transformation was performed to obtain a value scale ranging from 0% to 100% to achieve the efficiency criteria.

In this research, the efficiency of Malang City's SDGs environmental pillars was calculated without grouping per goal but calculated directly based on all indicators that supported the environmental pillars, namely a total of 28 indicators.

Table 6. Malang City SDGs Pillar Efficiency 2019-2022

Year	Efficiency
	%
2019	19.01
2020	-4.66
2021	13.46
2022	17.25

The efficiency of Malang City's SDGs environmental pillar based on supporting indicators was analyzed to determine good indicators and low-efficiency indicators without being grouped into objectives as well as when grouped into objectives. This was conducted as an option for determining priorities that must be carried out to increase efficiency. On a scale from 0 to 100%, the efficiency of Malang City's SDGs environmental pillar calculated from 28 indicators in 2019- 2022 (Table 7).

Table 7. Efficiency Based on Calculations for 2022 Environmental Pillar Indicators

Indicator	Efficiency
	%
Residential homes that have access to clean water	28.23
Residential homes that have adequate sanitation facilities/access	36.43
City irrigation in good condition	10.41
Water disposal is provided through the provision of storage structures	54.06
Healthy and safe environments supported by PSU	-68.65
Handling housing infrastructure	111.21
Handling housing infrastructure	-443.65
Houses that are uninhabitable	238.53
Handling slum areas	56.77
Land transportation services (number of land transportation/number of land transportation passengers)	-135.91
Public transportation KIR ownership	18.95
Preservation of cultural diversity and richness that is fostered	58.29
Increase in active traditional arts institutions	0.61
Increase in historical perpetrators	0.61
Increase in museum visitors	139.94
Cultural heritage preserved	1.48
Disaster-resistant communities	26.49
Average disaster response time	106.46
Disaster victims who received logistical assistance	-98.6
Infrastructure damage addressed after a disaster	-
Disaster victims who received social assistance during the response period	3.05
Waste handling	30.25
Prevention of environmental pollution and/or damage	4.32
Business actors who have managed B3 waste	31.59
Waste reduction in the community and informal sectors (is a cumulative value)	-
Community compliance and activities/businesses of environmental permit holders	180.43
Presentation of environmental planning documents that are structured and comply with standards	4.73
Managed public green open space	86.09

Table 8. Priorities 1 and 2 of The Efficiency Value

Indicator	Efficiency
	%
Priority 1	
Handling housing infrastructure	-443.65
Land transportation services	-135.91
Disaster victims who received logistical assistance	-98.60
Healthy and safe environments supported by PSU	-68.65
Priority 2	
Increase in active traditional arts institutions	0.61
Increase in historical perpetrators	0.61
Cultural heritage preserved	1.48
Disaster victims who received social assistance during the emergency response period	3.05
Environmental planning documents that are structured and meet standards	4.32
Prevention of environmental pollution and/or damage	4.73
Irrigation in good condition	10.41
Public transportation KIR ownership	18.95

Analysis of Malang City's SDGs environmental pillar based on the efficiency of 28 indicators without grouping per goal resulted in the best efficiency in 2019 (19.01%), followed by 2022 (17.25%). However, even though 2019 had the highest efficiency compared to other years, only 18 out of 28 indicators were implemented during that year. This means that only 64.29% of the indicators were implemented, whereas for 2022 SDGs environmental pillar efficiency of 17.25%, a total of 26 indicators were implemented and supported by the budget (92.86%). The purpose of analyzing the efficiency of each indicator was to determine the implementation of sustainable development and to compare the priority of indicators when they are not grouped into objectives. Table 8 presents the SDGs efficiency analysis for each environmental pillar for each indicator in 2022.

There are five efficiency indicators for Malang City's SGDs environmental pillars which fall into the "very good" category, namely the affordable livable housing services, uninhabitable houses, the increased museum visits, and average disaster response time. Meanwhile, there is only one indicator n the "good" category, namely the public open space managed with efficiency of 86.09%. For efficiency in the "very inadequate" category, namely those with an efficiency value of ≤50%, the indicators were divided into 2 groups. The first group is the indicators that require the greatest attention in budget allocation and the accuracy of its allocation (Priority 1), and the second group is the indicators with the next priority in budget allocation (Priority 2). Priority 1 indicators were sorted from the worst efficiency value (largest minus).

The Budget Allocation Priority

The achievement of Malang City's SDGs environmental pillar targets supports the city's Mission 1 (ensuring access and quality of education, health and other basic services for all citizens) and Mission 2 (creating a productive and competitive city based on a creative, sustainable and integrated economy). The realization of a productive and competitive city based on a creative, sustainable and integrated economy is supported by SDGs Goal 11 (sustainable cities and settlements), Goal 13 (addressing climate change), and Goal 15: (life on land). This is in accordance with the results of the efficiency analysis in which Goal 11 and Goal 13 are the first priorities that need to be improved in an effort to support economic growth. Meanwhile, according to the results of the efficiency analysis, Goal 15 has shown good efficiency (86.96%).

The goals to be achieved in Indonesia's economic development and the basis of development policy play a role in determining budget policy. The budget policy will further influence the economic development process itself, thereby creating a circular relationship (Kuncoro et al., 2014). Therefore, to continue supporting economic growth without reducing the budget while still paying attention to environmental sustainability to prevent environmental degradation, it is necessary to optimize the efficiency of budget allocations aimed at the environmental pillar to ensure that it maximizes the achievement of indicator output targets for each program/activity in the environmental pillar with the available budget allocation. From the research results, there are several measures that need to be implemented as follows.

First, the composition of budget allocations for the environmental pillar needs to be carried out through a money follow program approach, namely policies based on priority programs. The budget allocation must be clearly used for what purposes, where, how much, and so on. This approach is an effort to address previous development planning and budgeting problems, including duplication of programs and budgets, and planning and budgeting that have not been integrated. Wise (2002) stated that public sector management reform is also based on the demands of society in the 21st century where people no longer just believe that the government will make optimal use of people's money, but they want to see evidence (outcomes) that people's money is being used properly. The demand for updating the financial system is that the management of public money be carried out transparently based on the concept of value for money so as to create public accountability (Adikara, 2015). It is necessary to arrange cascading handling of environmental pillar issues down to regional apparatus so that the planned budgeting allocation is right on target. Cascading is the process of elaborating and aligning performance and performance targets vertically from the highest level to the lowest unit. Cascading specific targets of Malang City wants to achieve can be interpreted by regional officials in creating activities that are right on target.

Second, evaluation of performance results help governments or public organizations to understand the extent to which goals have been achieved. If there is a discrepancy between the results, corrective action can be taken. Based on the efficiency analysis, the priority for maximizing environmental pillar targets is that Goal 11 (sustainable cities and settlements) and Goal 13 (addressing climate change) need to be prioritized in increasing efficiency. Meanwhile, Goal 6 (clean water and adequate sanitation) and Goal 12 (responsible consumption and production) are the next priorities. Regional officials need to pay attention to the indicators for each of these goals and subsequently maximize activities to achieve these goals. By prioritizing resource allocation based on the expected impact, the use of funds can be more efficient and this strategic approach will not only enhance the overall sustainability efforts but also foster community engagement and awareness, ensuring that all stakeholders are aligned in their commitment to these critical objectives.

If compared according to the analysis of each indicator and an intersection is made using analysis per goal with the indicators that support it, the result is that Priority 1 in the efficiency analysis for each indicator is also Priority 1 in the analysis of efficiency based on goals. Meanwhile, Priority 2 in the analysis of each indicator coincides with Priority 1 in the analysis of efficiency based on goals. The budget allocation priority, namely Priority 1, includes housing infrastructure handling, land transportation services, disaster victims receiving logistical assistance, maintenance of a healthy and safe environment supported by PSU, and increasing the activity of traditional arts institutions. Priority 2 focuses on the historical actors, the cultural heritage preserved, the disaster victims receiving social assistance during the emergency response period, and the environmental planning documents that are structured and comply with standards. Priority 3 includes preventing pollution and/or environmental damage, ensuring city irrigation is in good condition, and ownership of public transportation KIR. Priority 4 includes maintaining a healthy and safe living environment supported by infrastructure, handling slum areas, preserving cultural diversity and richness, creating a disaster-resistant society, handling post-disaster infrastructure damage, handling waste, addressing climate change, providing residential houses with access to clean water, ensuring residential homes with adequate sanitation facilities/access, ensuring the availability of water through the provision of storage buildings, encouraging business actors to process B3 waste, reducing waste in the community and informal sector, and ensuring compliance with community/business activities holding environmental permits.

From the results of the goal-by-goal analysis and the analysis per indicator, the priority order for budget allocation can be used as a basis for sustainable budget fulfillment. This is especially true if the budget for the environmental pillar with limited Regional Budget (APBD) sources. Furthermore, collaboration between local governments, NGOs, and the private sector will be essential in driving innovative solutions and sharing best practices that can lead to measurable progress (Moallemi et al., 2020). Also, public awareness campaigns will educate the community regarding the importance of waste management and environmental protection, fostering a culture of sustainability that encourages active participation from all stakeholders (Brotosusilo et al., 2022).

Research Implication

This research makes a significant contribution to the understanding of budget management and sustainable development at the local level, particularly in Malang City. The implications can be categorized into three main aspects: theoretical implications, research development implications, and practical implications for users of the research results. By offering a comprehensive study of budget allocation efficiency and its role in achieving sustainable development goals (SDGs), especially in the environmental pillar, this research offers valuable insights for policy makers, academics and stakeholders.

This research refines the theoretical framework linking budget management efficiency with the SDGs achievement. Focusing on the SDGs environmental pillar adds an important layer to the development economics and public financial management literature (Nechita et al., 2020). However, there is a gap in exploring this relationship at the regional level, where local governments often face unique challenges and opportunities in aligning their budgeting practices with sustainability goals (Augustine, 2022).

This research builds on previous works by providing empirical evidence on how budget allocation efficiency directly affects the achievement of environmental targets within the SDGs framework. The research illustrates that efficient budget management is not only centered on cost savings but also on strategic resource allocation that promotes sustainable development. For example, this study found that efficient budget allocation for environmental projects in Malang City, such as renewable energy initiatives and waste management systems, has resulted in tangible progress towards the city's sustainability goals. These findings contribute to the broader theoretical discourse by emphasizing the strategic role of budget management in advancing regional sustainable development. In addition, this research challenges traditional budget management theories that often prioritize economic growth over environmental considerations. The research advocates an integrated approach where fiscal responsibility and environmental sustainability are not mutually exclusive but are interrelated goals that can be achieved through strategic financial planning. This perspective is in line with a growing body of literature calling for a paradigm shift in public financial management that recognizes sustainability as a core component of fiscal policy (Rodríguez Bolívar, 2017).

Future theoretical research can build on this study by exploring how different budget management models, such as participatory budgeting and performance-based budgeting, can be adapted to improve sustainable outcomes in various socio-economic contexts. The findings of this study pave the way for further investigation into sustainable budget management and SDG implementation at the regional level. One of the main implications is the need to explore how external factors, such as national policies, international funding mechanisms and global economic trends, affect the efficiency of regional budget allocations for sustainable development (Zatonatska et al., 2019). For example, future research could examine how national fiscal policies, such as green budgeting or environmental tax reforms, affect local governments' budget management practices and their ability to achieve SDG targets.

Another potential area for research development is a comparative analysis of different regions or municipalities to identify best practices in budget allocation for environmental sustainability. Although this research focuses on Malang City, a comparative approach could reveal variations in budget management efficiency and its impact on sustainability outcomes across different socio-economic and cultural environments. Such research would contribute to the development of a more nuanced understanding of the contextual factors that influence sustainable budget management, offering insights into the adaptability and scalability of successful strategies.

This research shows that a multidisciplinary approach is essential for a holistic understanding of sustainable budget management. By integrating perspectives from economics, environmental science, public administration and political science, future studies can develop more comprehensive strategies to optimize budget allocations to achieve sustainability goals (Sisto et al., 2020). For example, the intersection of environmental economics and public financial management could provide innovative models for financing sustainability initiatives such as green bonds, public-private partnerships or community-based funding mechanism. Furthermore, the findings of this study imply the importance of longitudinal research in this area. Given that sustainable development is a long-term process, there is a need for longitudinal

studies that track the impact of budget management practices on sustainability outcomes over time. Such research would provide valuable insights into the dynamic relationship between budget allocation efficiency and sustainable development, shedding light on how changes in fiscal policies, economic conditions and environmental priorities affect sustainability efforts at the regional level (Jia & Luo, 2022).

For the Malang City Government, this research offers concrete guidelines for developing more effective and sustainable budget management policies. By identifying the most efficient allocation of budget resources, the government can prioritize investments that yield the highest environmental benefits. For example, the research findings show that well- targeted investments in renewable energy infrastructure, sustainable transportation and waste management systems significantly accelerate progress towards the city's environmental goals. By focusing on these areas, governments can optimize resource use, as well as improving the overall quality of life of their citizens through improved environmental conditions.

The research also underscores the importance of participatory approaches to budget management. Involving stakeholders, such as civil society, the private sector, and local communities, in budget planning and execution processes can lead to more inclusive and effective strategies for sustainable development. This study highlights the potential of participatory budgeting as a tool for aligning public spending with community environmental priorities, ensuring that budget allocations reflect the various needs and aspirations of communities (Vulfovich, 2017). This approach can promote greater accountability and transparency, thereby increasing public trust and support for sustainability initiatives. In addition to informing local government policy, this research has broader practical implications for other municipalities and regions seeking to improve their sustainable development efforts. The findings provide a framework for assessing budget allocation efficiency and its impact on sustainability outcomes, which can be adapted and applied in different contexts. For example, cities facing similar environmental challenges can use research methodologies to evaluate their budgeting practices and identify areas for improvement. By adopting a data-driven approach to budget management, local governments can make more informed decisions that support sustainable development.

CONCLUSION AND SUGGESTION

Based on the analysis results of the budget allocation strategy during the period from 2019 to 2022, the most efficient planning and realization occurred in 2022. This research also shows that the budget allocation strategy sorts the group of indicators that need the most immediate attention into four budget allocation priorities. The first budget allocation priority consists of five indicators, the second priority consists of four indicators, the third priority consists of three indicators, and the fourth priority consists of 12 indicators. This priority grouping can serve as a sustainable budget allocation strategy, especially in the event of limited budget.

In accordance with the conclusion, the research recommends participatory budgeting as a support tool in protecting the environment to facilitate the budget for achieving economic growth and to ensure the maximum results of achieving environmental pillar targets. From the analysis, it was observed that indicators and goals are still inefficient, and this research did not examine factors influencing indicators and objectives that are inefficient. Therefore, it is hoped that further research explores these factors so that the policies to be implemented in the Malang City Government are more focused and targeted.

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