International Journal of Economic, Finance and Business Statistics (IJEFBS)
Vol. 4, No. 1, 2026 : 1-18

Subnational Loan Allocation and Fiscal Sustainability: An MCDA-Based Approach for Urban Infrastructure Financing in Indonesia

Citra Fadhilah Utami[1]*, Arum Ira Nadhira[2], Clarisa Rofiati[3], Della Affesia Putri[4]
Regional Infrastructure Development Agency, Ministry of Public Works
Corresponding Author: Citra Fadhilah Utami citra.fadhillah@pu.go.id

A R T I C L E I N F O

Keywords: Fiscal sustainability, Subnational borrowing, Infrastructure financing, Multi-Criteria Decision Analysis (MCDA), Urban Economic Capacity

Received: 18, December
Revised: 19, January
Accepted: 29, February

A B S T R A C T

Urban infrastructure financing in Indonesia faces a structural funding gap alongside rising subnational fiscal risk under decentralization. Therefore, this study aimed to develop a Multi-Criteria Decision Analysis framework to allocate loans across 50 priority cities in the 2025–2029 National Development Plan. The framework integrated fiscal capacity, debt sustainability, institutional readiness, public investment productivity, and spatial role into three composite indices, namely Soft Gate, Impact, and Priority. Using a weighted additive framework with percentile-based screening, cities were classified into Loan Priority, Blended, Grant, and Selective categories. The results showed that 28 percent qualified as Loan Priority, while 24 percent require blended mechanisms due to fiscal-impact mismatch. In conclusion, the framework enhances fiscal discipline and transparency in subnational borrowing decisions.

DOI: https://doi.org/10.59890/ijefbs.v4i1.327
ISSN-E:3025-9959
https://dmimultitechpublisher.my.id/index.php/ijefbs

INTRODUCTION

Urban infrastructure financing in Indonesia faces a structural imbalance between rapidly expanding development needs and constrained fiscal capacity within a decentralized governance system (Wibowo et al., 2016). According to the budget ceiling indications for the 2024 fiscal year (FY), there is a funding gap of IDR 172.1 trillion between financing needs and the allocation budget in DIPA. This gap between investment requirements and fiscal capacity has prompted the government to rely on both domestic and international loans as key instruments for development financing (Ussa'diyah & Vidriza, 2022). Rapid urbanization further increases demand for basic services, including drinking water, sanitation, transportation, and housing, at a time when government fiscal capacity remains limited. The OECD (2020) emphasizes that urban infrastructure financing in developing countries is structurally challenged by limited fiscal space and heavy reliance on central transfers. In Indonesia's decentralized fiscal system, local governments possess expanded expenditure authority, but macro-fiscal stability remains the responsibility of the central government. Consequently, loan-based financing instruments, including on-lending mechanisms to subnational governments, are increasingly used to address infrastructure funding gaps.

The use of loan-based financing, including external on-lending mechanisms to subnational governments, has increasingly become a strategic instrument to address infrastructure deficits. The IMF (2023) emphasized that the post-pandemic increase in global public debt necessitates strengthened fiscal risk management frameworks, including at the subnational level. Within a decentralized fiscal system, mismanagement of local government debt can generate spillover effects that threaten national fiscal stability. Therefore, the selection of cities eligible for loan financing is not merely an administrative exercise but a strategic policy decision with significant macroeconomic implications.

From a theoretical perspective, this issue can be analyzed through the framework of fiscal federalism. Oates (2006) stated that fiscal decentralization enhances allocative efficiency because subnational governments are better positioned to respond to local preferences. However, decentralization also requires credible fiscal discipline mechanisms to prevent budget imbalances. Qian & Weingast (1997) Further mentioned that in the absence of binding fiscal constraints, subnational governments may face soft budget constraints, particularly when expectations of central government bailouts persist. In this context, the concept of subnational creditworthiness becomes essential. Liu L & Tan (2009) stated that access to borrowing should be grounded in fiscal capacity, revenue stability, debt ratios, and the quality of financial governance. Without rigorous assessment, borrowing may increase default risk. Moreover, Liu and Waibel (2010) demonstrated that subnational debt crises in developing economies may produce systemic repercussions for national fiscal stability.

From the perspective of public investment theory, debt is productive only when allocated to projects that generate adequate social and economic returns. Gaspar et al. (2016) emphasized that the effectiveness of public investment depends critically on institutional quality and project management capacity. In

addition, urban growth theory underscores the importance of prioritizing investment in strategically positioned cities capable of generating strong agglomeration and multiplier effects (OECD, 2020).

In Indonesia, the majority of studies on external borrowing only emphasize a national perspective or macro-fiscal aspects. Conversely, there is comparatively less literature that discusses the selection of cities eligible for loans by combining public borrowing theory, urban dynamics, and Indonesia regulatory framework. Distinctions in city characteristics and typologies, such as city size, economic role, and the position in the national urban system, are also not frequently factored into eligibility assessments for loans. However, these typology considerations would be important to ensure external borrowing targets cities that are both fiscally fit and also strategically located, maximizing the developmental impact on the broader urban system.

Based on the discussion above, this study aimed to develop a Multi-Criteria Decision Analysis (MCDA)-based framework for selecting loan-eligible cities by integrating fiscal capacity, debt risk, public investment productivity, institutional capacity, and strategic urban role. The primary contribution is grounded in proposing an integrated approach that is not only theoretically balanced but also practically applicable for shaping urban infrastructure financing policy in Indonesia and other developing economies.

LITERATURE REVIEW

According to the Government of the Republic of Indonesia Regulation No. 10 of 2011 concerning the Procedures for the Procurement of External Loans and Grants, external loans are defined as financing obtained through debt agreements with foreign lenders, excluding government securities, and subject to specific contractual requirements. In general, these loans are classified into two types, namely cash and project. Law No. 17 of 2025 concerning the State Budget for Fiscal Year 2026 further defines cash loans as external borrowing in foreign currency and/or domestic currency used to finance the state budget deficit and manage the government debt portfolio. Therefore, external borrowing serves not only as a deficit-financing instrument but also a mechanism to fund priority development projects. Empirical evidence suggests that external borrowing can generate positive multiplier effects on the economy, while short-term external borrowing may provide fiscal flexibility in managing budget deficits (Ussa'diyah & Vidriza, 2022).

The procurement and management of external loans in Indonesia are comprehensively regulated under Government Regulation No. 10 of 2011. Loan management comprises planning, negotiation, budgeting, disbursement, debt servicing, administration, monitoring, and evaluation, as well as disclosure. External loans may originate from multilateral institutions, including the World Bank, Asian Development Bank, Islamic Development Bank, and the International Fund for Agricultural Development, bilateral agencies, namely JICA, KfW, China Exim Bank, and AFD, as well as commercial lenders in the form of ING, BNP Paribas, Credit Agricole, and UniCredit. Article 7 of the Regulation stipulates that external loans may be allocated to finance the state

budget deficit, fund priority government programs, manage the national debt portfolio, on-lend to subnational governments and state-owned enterprises, or be transferred as grants to regional governments. In some cases, subnational governments may further channel externally financed funds to regionally owned enterprises.

Within the framework of fiscal federalism, public finances, including revenues, expenditures, and borrowing, are allocated and managed across different tiers of government with distinct but interconnected responsibilities. However, subnational governments in Indonesia generally have limited own-source revenue capacity. Many areas face substantial expenditure obligations relative to revenue base, creating structural dependence on central government transfers (Badan Pengkajian MPR RI, 2022; Faoziah Sifah & Rifqi, 2025). Current literature on subnational finance has identified creditworthiness as a fundamental criterion for determining eligibility for loan-based financing. For example, Liu L & Tan (2009) stated that access to borrowing should not be determined solely by development needs, but rather by a government demonstrated capacity to manage financial obligations. Key determinants include fiscal strength, revenue stability, debt burden, and institutional and governance quality. Comparative analysis of subnational credit rating practices across countries indicates that creditworthiness assessments function as effective fiscal discipline mechanisms, reducing default risk while enhancing transparency and accountability in public financial management.

Table 1. Theoretical and Regulatory Foundations of Subnational Loan Eligibility Criteria

Theoretical Framework	**Indonesian Regulatory Basis**	**Implications for City Loan Selection Variable**
Fiscal Federalism	Law No. 23/2014; Gov. Reg. No. 12/2019	Fiscal autonomy and expenditure capacity assessment
Creditworthiness	Gov. Reg. No. 56/2018; MoF Reg. No. 109/2023	DSCR, debt ratios, audit quality
Debt Sustainability	Law No. 17/2003; Gov. Reg. No. 56/2018	Debt limits and prudential safeguards
Public Investment Theory	Law No. 23/2014	Loans must finance productive investment
Urban Growth Theory	Gov. Reg. No. 59/2022	Priority for strategically positioned cities
Institutional Capacity	Gov. Reg. No. 12/2019; Supreme Audit Board	Administrative and governance readiness
Moral Hazard Theory	Central approval mechanism	Prevention of bailout expectations

Liu and Tan emphasized that in developing countries, subnational borrowing capacity is deeply shaped by intergovernmental fiscal relations. Fiscal risks originating at the local level may ultimately affect national financial stability, implying that subnational debt capacity cannot be assessed

independently of the country overall fiscal condition. In this context, the central government plays a crucial role in establishing fiscal rules, conducting oversight, and determining eligible borrowing entities. These results are particularly relevant for Indonesia, where subnational borrowing remains subject to central approval and city-level loan selection constitutes a key mechanism for safeguarding national fiscal sustainability while promoting effective urban development financing.

Complementing this perspective, Liu & Waibel (2010) emphasized the systemic risk dimension of subnational borrowing and stressed the importance of credit risk management and default resolution mechanisms within national policy frameworks. The study demonstrated that local government debt distress not only affects the fiscal condition of the borrowing jurisdiction but also broader financial stability and sovereign reputation. Consequently, strong rule-based frameworks and centralized oversight are considered more effective than reliance on market discipline alone in developing economies. These studies indicate that the selection of eligible subnational governments or cities for loan-based financing constitutes a critical policy instrument for maintaining fiscal sustainability and ensuring effective development outcomes.

In the Indonesian context, existing studies largely focus on national debt management or macro-fiscal aggregates. Empirical studies that integrate fiscal federalism, creditworthiness assessment, urban growth dynamics, and regulatory safeguards into a unified subnational loan allocation framework remain scarce. Current eligibility assessments rely primarily on regulatory ratio thresholds rather than multidimensional composite screening mechanisms. This gap underscores the need for an integrated analytical framework capable of balancing fiscal sustainability, development impact, institutional readiness, and spatial equity within subnational loan allocation decisions.

METHODOLOGY

The population of this study consisted of 50 priority cities identified in Indonesia 2025–2029 National Medium-Term Development Plan (RPJMN) (table 2). The cities were selected based on the strategic role in the national urban system and the eligibility for infrastructure financing under central government planning frameworks. This study used a census approach rather than sampling, as all designated priority cities were included in the analysis. Data were derived from official government sources, including Ministry of Finance fiscal reports, regional budget realization documents, audit reports from the Supreme Audit Board (BPK), and sectoral infrastructure indicators from the Ministry of Public Works. All variables reflect the most recent available fiscal year before the analysis period.

The methodology of this study used Multi-Criteria Decision Analysis (MCDA) as the analytical framework for selecting cities eligible for external loan allocation. MCDA is rooted in operations studies and provides a structured decision-making framework for assessing competing alternatives based on multiple criteria. It is frequently used in public planning, policy analysis, and project management to identify optimal options in complex decision

environments. The World Bank has adopted multi-criteria prioritization frameworks in project selection processes by systematically integrating social-environmental and financial-economic dimensions. Similarly, (Juričić et al., 2020) stated that applying multi-criteria approaches at the early stage of financing framework selection enhances both the quality and volume of revenue-generating public investments.

Table 2. 50 Priority Cities Identified in Indonesia 2025–2029 National Medium-Term Development Plan (RPJMN)

Metropolitan	**New Metropolitan**	**Industrial City**	**Tourism City**
WM Medan WM Palembang WM Jakarta WM Bandung WM Semarang WM Surabaya WM Denpasar WM Banjarmasin WM Makassar WM Manado	WM Pekanbaru WM Yogyakarta WM Surakarta WM Malang	Kota Cilegon Kab Batang Kab Gresik (Gresik) Kab Morowali Kab Konawe Kab Luwu Timur (Sorowako) Kab Halmahera Tengah (Weda) Kab Mempawah (Kijing) Kota Bitung	Kab Toba (Balige) Bintan-Tanjung Pinang Kota Tanjung Pinang Kab Buleleng (Singaraja) Kota Mataram KB Manggarai Barat (Labuan Bajo) Kota Bukittinggi Kab Belitung Kota Gorontalo Kota Ambon
Trading City	**Education City**	**Special Character Small City**	
Kota Bandar Lampung Kota Samarinda Kota Balikpapan Kota Sorong Kota Bengkulu Kota Surakarta Kota Jayapura Kota Manado	Kota Depok Kab Sumedang (Jatinangor) Kota Salatiga Kota Malang Kab Banyumas (Purwokerto)	Kab Tana Toraja (Makale) Kab Maluku Tengah (Banda Neira) Kab Pulau Morotai (Daruba) Kab Pegunungan Arfak (Anggi)	

In this study, MCDA was used as a structured decision-support framework to integrate fiscal, financial, investment, institutional, and spatial dimensions into a composite index for screening the eligibility of cities in loan-financed urban development programs. The procedure employed a weighted additive framework, selected for the simplicity, transparency, and suitability for public policy applications. This framework facilitates replicability and accountability in government decision-making processes. The MCDA-based loan

selection process consisted of five sequential steps. First, the study established core selection principles, integrating fiscal capacity, institutional readiness, growth potential, and regional equity considerations. Second, relevant data were systematically collected from official sources, including BRIN, BPS (Statistics Indonesia), Bappenas, and the Ministry of Public Works. Third, the MCDA framework was constructed by developing the Soft Gate Index (capacity), the Impact Score (development potential), and the aggregated Priority Index. Fourth, cities were classified into four financing categories, namely Loan Priority, Blended Financing, Grant, and Selective Activity, based on the composite scores. Finally, the results were evaluated against regional equity and readiness criteria to ensure balanced and sustainable subnational loan allocation. The stages of the analysis are illustrated in the framework presented in Figure 1.

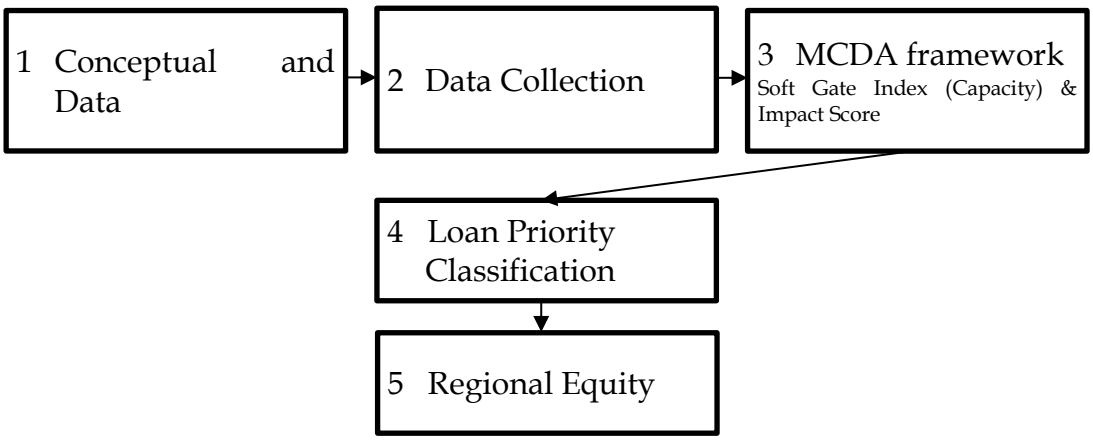

Figure 1. MCDA-Based City Loan Selection and Classification Process Framework

The first stage of the analytical framework was carried out by translating theoretical constructs into measurable variables and verifiable data sources, as shown in Table 3. In this stage, each theoretical foundation was systematically mapped into observable indicators to ensure construct validity and empirical consistency. Fiscal federalism was operationalized through indicators of regional fiscal capacity and economic contribution, proxied by GRDP contribution and regional economic share. Subnational creditworthiness and institutional capacity were measured using competitiveness indices and governance scores, which served as proxies for administrative capability, fiscal management quality, and economic resilience.

Table 3. Conceptual and Data Framework for City-Level Loan Eligibility Assessment

Theoretical Basis	**Variable**	**Data Source**
Fiscal Federalism	Regional Fiscal Capacity (PDRB Contribution) 2024	BPS
	Regional Economic Contribution 2024	BPS
Subnational Creditworthiness	PDRB Contribution 2024	BPS
Institutional Capacity Theory	Regional Competitiveness Index 2024	BRIN
Audit and Administrative Readiness	Mission 5 Governance Index	Bappenas
Public Investment Theory	Water Service Gap 2024	Ministry of Public Works
	Wastewater Service Gap 2024	Ministry of Public Works
Urban Growth Theory	GRDP (log)	BPS
	Mobility Index	Ministry of Public Works
Urban Competitiveness Theory	Regional Competitiveness Index 2024	BRIN
Sustainable Urban Development	Sustainable City Index 2024	Bappenas
Strategic Development Planning	City Development and Prosperity Index 2024	Bappenas

BPS: Statistic Indonesia
BRIN: National Research and Innovation Agency

Public investment theory was operationalized through infrastructure service gap indicators (water and wastewater coverage), capturing unmet basic service demand as a proxy for potential marginal returns to investment. Urban growth theory was represented by the logarithm of GRDP and mobility indicators, reflecting economic scale and connectivity effects. In addition, sustainable urban development and strategic planning dimensions were incorporated through composite indices measuring long-term sustainability performance and alignment with national development priorities.

The second stage of the analytical procedure was conducted in a structured and sequential manner. First, all indicators representing the five assessment dimensions were normalized using the min–max normalization method to ensure comparability across variables with different measurement scales. This transformation converted each indicator value into a standardized range between 0 and 1, thereby eliminating distortions caused by differing units of measurement. The normalization follows the formula:

$$Xnorm = \frac{Xi - Xmin}{Xmax - Xmin} \text{.....(1)}$$

where XiX_iXi represents the observed value of a given city, and X_{min} and X_{max} denote the minimum and maximum values across the full sample.

Second, weights were assigned to each dimension and indicator. Weight determination was theoretically grounded in the literature on fiscal federalism, subnational creditworthiness, and debt sustainability, while also incorporating prudential fiscal principles embedded in national regulatory frameworks. Fiscal capacity and debt risk dimensions received relatively higher weights due to the direct relevance to repayment capacity. Meanwhile, development impact and strategic urban role were weighted to ensure that loan allocation remains productivity-oriented and growth-enhancing.

The third stage consisted of constructing the Soft Gate Index, which represents the capacity dimension and functions as a preliminary screening mechanism. This composite index integrates fiscal capacity, debt position, and institutional readiness into a single score measuring a city fundamental preparedness to receive loan financing. The Soft Gate Index is calculated as follows:

*SoftGate_Index=0.30*IDSD_norm+0.25*Misi5_norm+0.20*IKB_norm+0.15*Kontribusi_PDRB_norm+0.10*Log_PDRB_norm* ……..(2)

Cities are classified using a percentile threshold approach:

$$SoftGate\ Status = \begin{cases} Eligible\ Loan\ Candidate & if\ SoftGate\ Index\ \geq P_{60} \\ Not\ Yet\ Eligible & otherwise \end{cases} \quad \ldots(3)$$

A higher Soft Gate Index indicates stronger readiness for loan financing.

The fourth stage comprised constructing the Impact Score, which measures the potential developmental impact of loan-financed investments. This index incorporated indicators of basic service gaps, economic growth potential, and the city strategic role within the national urban system. The Impact Score ensures that loan allocation prioritizes not only fiscal capacity but also socio-economic returns. It is computed as follows:

*Impact_Score==0.25*Gap_AirBersih + 0.20*Gap_AirLimbah + 0.20*Mobilitas_norm + 0.20*Log_PDRB_norm + 0.15*Misi3_norm* ……..(4)

Cities exceeding the 60th percentile are categorized as high-impact jurisdictions:

$$Impact\ Status\ = \begin{cases} High\ Impact & if\ Impact\ Score \geq P_{60} \\ Normal\ Impact & otherwise \end{cases} \quad \ldots.(5)$$

Higher scores indicate stronger potential growth and multiplier effects.

In the fifth and final stage, the Priority Index, which aggregates the capacity and impact dimensions into a unified decision metric, was computed. The Priority Index reflects a balanced evaluation between fiscal readiness and developmental potential:

$$Priority\ Index\ = 0.55(Impact\ Score) + 0.45(Soft\ Gate\ Index) \quad \ldots.(6)$$

Cities are categorized as follows:

$$Category = \begin{cases} Loan\ Priority & If\ Priority\ Index \geq P_{60} \\ Blended\ Financing & if\ Impact\ Score \geq P_{60}\ and\ Priority\ Index < P_{60} \\ Grant - Based\ Support & otherwise \end{cases} ..(7)$$

The fourth stage of the analytical framework is the classification of cities into financing categories based on the relative positions within the Capacity–Impact matrix, as illustrated in Figure 2. This stage integrated the Soft Gate Index (representing fiscal and institutional capacity) and the Impact Score (representing development potential) into a quadrant-based decision framework. The intersection of these two composite indices produced four distinct financing typologies.

Cities located in the High Capacity–High Impact quadrant were categorized as *Loan Priority*, indicating both sufficient repayment capacity and strong developmental multiplier potential. These jurisdictions are considered eligible for conventional loan financing. Cities in the High Impact–Low Capacity quadrant were classified under *Blended Financing*, where developmental urgency is high but fiscal constraints necessitate risk-sharing mechanisms such as co-financing or partial grants. The Low Impact–Low Capacity quadrant corresponded to *Grant-Based Support*, reflecting limited fiscal space and lower measurable investment returns, thereby reducing the suitability of debt financing. Finally, cities in the High Capacity– Low Impact quadrant fell into the *Selective Activity* category, where borrowing may be justified only for targeted and productivity-enhancing projects rather than broad infrastructure expansion.

Figure 2. MCDA-Based Loan Allocation Quadrant Framework

This quadrant-based classification operationalized the balance between fiscal sustainability and developmental impact, ensuring that loan allocation decisions are both economically justified and risk-sensitive. By structuring eligibility using composite index thresholds, stage four transformed quantitative scores into actionable financing strategies within a transparent, rule-based framework.

The fifth stage incorporated a spatial perspective to ensure that the results of the loan classification do not create regional imbalance. After cities were categorized into Loan Priority, Blended, Grant, and Selective Activity groups, the geographic distribution was examined across Western and Eastern Indonesia. This step is intended to evaluate whether financing decisions are concentrated in already dominant areas or distributed more evenly across the national territory. The spatial analysis was conducted by mapping the classified cities and

reviewing the distribution according to urban typology, including metropolitan areas, secondary cities, and new growth centers. The analysis assessed whether loan priority cities were disproportionately located in Java and the western region, or also appeared in eastern provinces and non-metropolitan areas. This examination allows the framework to be evaluated not only in terms of fiscal capacity and development impact, but also from the perspective of territorial balance. By incorporating spatial analysis, the framework moves beyond purely economic and financial criteria. It ensures that loan allocation supports inclusive regional development and is consistent with national objectives of reducing spatial disparities. In this context, stage five strengthens the overall framework by integrating fiscal sustainability, development effectiveness, and regional equity into a coherent and balanced decision process.

RESULTS AND DISCUSSION

The quadrant analysis integrating the Soft Gate Index (capacity dimension) and Impact Score (development potential dimension) produced a differentiated classification of subnational jurisdictions into four strategic financing categories, namely Loan Priority, Blended Financing, Grant-Based Support, and Selective Activity. This typology reflects the balance between fiscal readiness and developmental urgency in determining the appropriate financing instrument. The Loan Priority quadrant consists of cities and metropolitan areas demonstrating both strong fiscal capacity and substantial development impact potential. These include WM Medan, WM Manado, WM Palembang, WM Makassar, WM Surakarta, WM Banjarmasin, WM Pekanbaru, Kota Mataram, Kota Manado, Kota Gorontalo, Kota Bengkulu, Kota Samarinda, Kabupaten Banyumas (Purwokerto), and Kabupaten Buleleng (Singaraja). The areas are characterized by adequate repayment capacity, relatively strong economic bases, and significant infrastructure multiplier effects. The inclusion in this quadrant indicates that conventional loan financing is fiscally sustainable and developmentally justified. The presence of multiple regional metropolitan areas suggests that the framework captures economically dynamic growth centers beyond the primary national core.

The Blended quadrant comprised Kota Cilegon, Kota Bandar Lampung, Kota Bukittinggi, Kota Sorong, Kabupaten Toba (Balige), Kabupaten Konawe, Kabupaten Tana Toraja (Makale), Kabupaten Morowali, Kabupaten Batang, Kabupaten Halmahera Tengah (Weda), Kabupaten Maluku Tengah (Banda Neira), and Kabupaten Pulau Morotai (Daruba). These areas demonstrate high development impact potential, often characterized by significant infrastructure service gaps or strategic geographic positioning but relatively limited fiscal strength. Therefore, full loan exposure may increase fiscal vulnerability. Blended financing mechanisms, combining loans with grants, guarantees, or co-financing structures, are more appropriate. This classification reflects a calibrated approach to balancing growth promotion with fiscal risk mitigation. The Grant quadrant comprised WM Yogyakarta, Kota Malang, Kota Salatiga, Kota Ambon, Kota Jayapura, Kota Bitung, Kabupaten Sumedang (Jatinangor), Kabupaten Bintan (Tanjung Pinang), Kabupaten Mempawah (Kijing), Kabupaten Gresik,

Kabupaten Manggarai Barat (Labuan Bajo), Kabupaten Pegunungan Arfak (Anggi), and Kabupaten Luwu Timur (Sorowako).

These areas have comparatively lower fiscal readiness and moderate-to-limited measurable development impact within the current indicator framework. In this context, debt-financed investment may not generate sufficient economic returns to justify repayment risk. Therefore, grant-based or highly concessional financing is recommended to avoid fiscal stress while still addressing essential infrastructure needs. The Selective Activity quadrant included WM Jakarta, WM Semarang, WM Surabaya, WM Denpasar, WM Bandung, WM Malang, Kota Balikpapan, Kota Depok, Kota Surakarta, Kota Tanjung Pinang, and Kabupaten Belitung.

These areas demonstrate relatively strong fiscal capacity but lower marginal development impact under the current scoring framework. Many of these cities are already economically advanced with relatively smaller infrastructure service gaps. For these areas, borrowing may be justified only for targeted, productivity-enhancing investments rather than broad-based infrastructure expansion. This category reflects efficient capital allocation principles, ensuring that debt is used where marginal returns remain significant. The quadrant distribution showed that Loan Priority cities are geographically dispersed across Sumatra, Kalimantan, Sulawesi, Bali, and other regions, reducing excessive concentration in Java. Meanwhile, Blended Financing areas are predominantly located in developing or resource-based areas where growth potential is high but fiscal capacity remains constrained.

Table 4. MCDA-Based Quadrant Classification of Subnational Financing Categories

Impact Score	**Blended**	**Loan Priority**
	1. Kota Cilegon 2. Kota Bandar Lampung 3. Kota Bukittinggi 4. Kota Sorong 5. Kabupaten Toba (Balige) 6. Kabupaten Konawe 7. Kabupaten Tana Toraja (Makale) 8. Kabupaten Morowali 9. Kabupaten Batang 10. Kabupaten Halmahera Tengah (Weda) 11. Kabupaten Maluku Tengah (Banda Neira) 12. Kabupaten Pulau Morotai (Daruba)	1. WM Medan 2. WM Manado 3. WM Palembang 4. WM Makassar 5. WM Surakarta 6. WM Banjarmasin 7. WM Pekanbaru 8. Kota Mataram 9. Kota Manado 10. Kota Gorontalo 11. Kota Bengkulu 12. Kota Samarinda 13. Kabupaten Banyumas (Purwokerto) 14. Kabupaten Buleleng (Singaraja)

	Grant 1. WM Yogyakarta 2. Kota Malang 3. Kota Salatiga 4. Kota Ambon 5. Kota Jayapura 6. Kota Bitung 7. Kabupaten Sumedang (Jatinangor) 8. Kabupaten Bintan – Tanjung Pinang 9. Kabupaten Mempawah (Kijing) 10. Kabupaten Gresik (Gresik) 11. Kabupaten Manggarai Barat (Labuan Bajo) 12. Kabupaten Pegunungan Arfak (Anggi) 13. Kabupaten Luwu Timur (Sorowako)	**Selective Activity** 1. WM Jakarta 2. WM Semarang 3. WM Surabaya 4. WM Denpasar 5. WM Bandung 6. WM Malang 7. Kota Balikpapan 8. Kota Depok 9. Kota Surakarta 10. Kota Tanjung Pinang 11. Kabupaten Belitung
	Soft Gate Index	

The presence of major metropolitan areas within the Selective Activity category showed that the framework did not automatically prioritize large cities solely based on size. Instead, eligibility was contingent on measurable development impact relative to fiscal strength. The quadrant classification generally confirms that the MCDA-based framework successfully differentiates financing strategies according to fiscal sustainability and developmental return considerations. The results provide a structured and risk-sensitive basis for subnational infrastructure loan allocation.

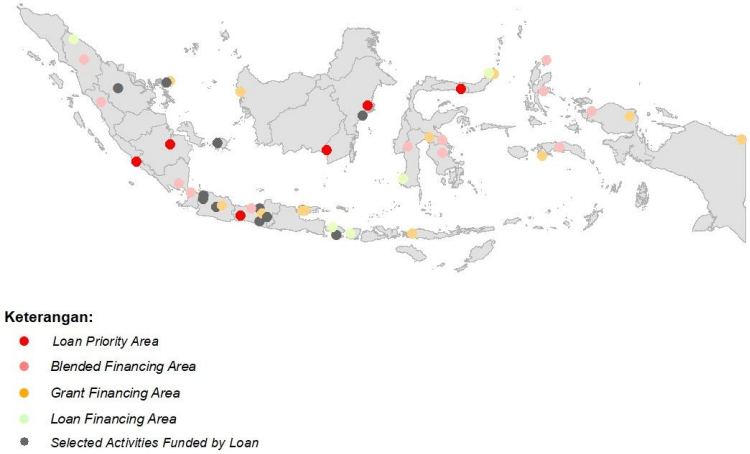

Figure 3. Spatial Distribution of City Financing Categories Based on MCDA Classification

The spatial distribution of financing categories shows a relatively balanced allocation across Indonesia major island groups, rather than excessive concentration in dominant metropolitan areas. The Loan Priority Areas (red markers) are distributed across western, central, and eastern areas, including Sumatra, Java, Kalimantan, Sulawesi, and parts of Eastern Indonesia. This pattern indicates that eligibility is not confined to traditionally developed urban corridors but extends to new regional growth centers. The **Blended Financing Areas** (pink markers) are geographically dispersed, particularly in regions with strong development impact potential but relatively limited fiscal capacity. These cities are found across multiple island clusters, suggesting that infrastructure gaps and growth opportunities are not spatially homogeneous.

The **Grant Financing Areas** (yellow markers) are also widely distributed, particularly in areas characterized by lower fiscal readiness and moderate development impact. The presence in both western and eastern regions indicates that fiscal constraints remain a cross-regional issue rather than a geographically isolated phenomenon. The **Loan Financing Areas** (light green markers) and **Selected Activities Funded by Loan** (gray markers) appear in strategic urban nodes, including secondary metropolitan areas and regional economic hubs. These classifications reflect cities with sufficient fiscal strength but varying impact potential, where selective or partial financing is considered more appropriate. More importantly, the distribution pattern suggests that the framework avoids over-concentration in Java Island and the Western Indonesia Region (Kawasan Barat Indonesia). A significant proportion of prioritized cities were located outside Java, indicating that the MCDA-based framework supports spatial equity while maintaining fiscal prudence. Overall, the spatial pattern confirms that the allocation framework integrates both economic viability and territorial balance considerations, reinforcing the suitability as a sustainable and regionally inclusive urban financing strategy.

Empirical evidence provides strong support for the theoretical foundations underpinning this study, particularly fiscal federalism and subnational creditworthiness frameworks. The identification of fiscally strong cities as Loan Priority candidates is consistent with Oates (1999), who stated that decentralized governments can allocate resources efficiently when supported by adequate fiscal capacity. However, the results also confirm Weingast (2014) warning regarding soft budget constraints. Cities with weaker fiscal indicators and high development impact potential were not automatically categorized as full loan recipients but rather directed toward blended financing schemes. This outcome demonstrates that the framework effectively incorporates fiscal discipline mechanisms, reducing the possibility of excessive borrowing driven by bailout expectations.

From a creditworthiness perspective, the results validate Liu and Tan (2009) assertion that borrowing eligibility should be grounded in measurable fiscal strength rather than development needs alone. Cities with higher debt service coverage ratios and stronger revenue bases consistently ranked above the eligibility threshold. The percentile-based screening mechanism functions as a practical proxy for subnational credit assessment, reinforcing fiscal

accountability and reducing default risk. Moreover, the differentiation between Loan Priority and Blended Financing categories reflects Liu and Waibel (2010) emphasis on mitigating systemic fiscal risk through centralized oversight and rule-based frameworks.

The results also substantiate public investment theory. Gaspar et al. (2021) stated that debt-financed public investment enhances growth only when institutional quality and project management capacity are sufficient. The inclusion of institutional capacity and productivity indicators in the Soft Gate Index ensures that loan allocation is tied to implementation readiness, thereby strengthening the possibility of productive capital formation. Cities categorized as High Capacity–High Impact have characteristics consistent with growth-enhancing investment environments, suggesting that the framework effectively identifies jurisdictions capable of translating borrowing into economic returns.

In terms of urban growth theory, the spatial distribution of Loan Priority cities supports OECD (2020) results regarding agglomeration economies and regional growth multipliers. Although major metropolitan areas demonstrate strong fiscal and economic indicators, the framework does not exclusively concentrate loan allocation within dominant urban corridors. Instead, several secondary and emerging growth centers qualify under the High Capacity–High Impact classification. This outcome suggests that the framework balances efficiency considerations with spatial equity objectives, avoiding excessive centralization while preserving economic viability.

The categorization of High Impact–Low Capacity cities into blended financing arrangements reflects a nuanced integration of growth potential and fiscal prudence. This approach recognizes that infrastructure investment in fiscally constrained but economically promising cities may generate substantial social returns. However, risk-sharing mechanisms are required to maintain sustainability. The differentiation strengthens the theoretical contribution of the model by bridging fiscal federalism and urban growth paradigms within a single decision framework.

Overall, the results confirm that the MCDA-based composite index operationalizes theoretical principles into an applied policy instrument. The integration of fiscal capacity, debt sustainability, institutional readiness, and development impact produces a structured and transparent screening mechanism. Consequently, the framework addresses key theoretical concerns, including soft budget constraints, systemic fiscal risk, and investment productivity, while offering a practical approach to subnational loan allocation in decentralized governance systems.

This study has several important policy implications for subnational infrastructure financing within decentralized fiscal systems. First, the results underscore the necessity of adopting a **risk-based loan allocation framework** grounded in measurable fiscal indicators. By incorporating debt service capacity, revenue stability, and institutional quality into a composite index, policymakers can reduce discretionary bias and strengthen fiscal discipline. This is particularly important in rising economies, where subnational borrowing may generate contingent liabilities for the central government.

Second, the differentiation between Loan Priority and Blended Financing categories suggests that infrastructure financing policies should not be binary (loan versus grant), but rather structured along a **graduated financing continuum**. Cities with high development impact potential but constrained fiscal space require hybrid instruments, such as co-financing, output-based aid, or partial guarantees, to balance growth objectives with fiscal prudence. This approach mitigates moral hazard while preserving investment momentum in strategically important urban areas.

Third, the percentile-based screening mechanism enhances **transparency and predictability** in loan allocation decisions. Clear eligibility thresholds can improve market confidence, foster better fiscal management at the local level, and incentivize cities to strengthen revenue performance and governance quality. Over time, this may create a virtuous cycle in which subnational governments improve creditworthiness to access more favorable financing conditions.

Fourth, from a macro-fiscal perspective, the framework supports the central government role in maintaining national debt sustainability. By integrating fiscal capacity and systemic risk considerations into the selection process, the framework reduces the probability of subnational debt distress that could spill over into national fiscal accounts. This is consistent with international recommendations emphasizing centralized oversight combined with rule-based borrowing frameworks in developing countries.

Fifth, the spatial distribution results imply that infrastructure loan allocation can simultaneously promote **regional equity and economic efficiency**. The framework enables support for emerging growth centers with demonstrated capacity and impact potential rather than concentrating resources solely in dominant metropolitan regions. This balanced approach may contribute to reducing regional disparities while sustaining aggregate economic productivity.

Finally, the MCDA framework serves as a **decision-support tool** that can be institutionalized within national development planning systems. It may be adapted for other sectors beyond urban infrastructure, including climate resilience, transportation, and social infrastructure. The methodological flexibility allows periodic recalibration of weights and indicators in response to macroeconomic changes or regulatory adjustments. This study demonstrates that integrating fiscal sustainability principles with development impact criteria enhances the effectiveness, transparency, and resilience of subnational infrastructure financing policy. The approach is particularly relevant for countries navigating rapid urbanization under constrained fiscal conditions.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study developed a structured MCDA framework to support the allocation of subnational infrastructure loans within a decentralized fiscal system. By integrating fiscal capacity, debt risk, institutional readiness, public investment productivity, and strategic urban role into composite indices, the framework provides a transparent and replicable mechanism for screening

loan-eligible cities. The empirical evidence demonstrates that combining repayment capacity indicators with development impact metrics yields a balanced classification of cities into Loan Priority, Blended Financing, Grant-Based Support, and Selective Activity categories.

The results confirm that loan allocation decisions should not be based solely on infrastructure needs, but must also consider fiscal sustainability and systemic risk. Cities with strong fiscal fundamentals and high development impact potential are the most appropriate candidates for loan financing. Conversely, cities with high impact but limited fiscal capacity require hybrid or risk-sharing financing arrangements to prevent overexposure to debt. This differentiation enhances macro-fiscal stability while maintaining developmental effectiveness.

From an implementation perspective, the results can be operationalized through several institutional mechanisms. First, the composite index framework may be formally integrated into national development planning and external loan appraisal procedures, serving as a standardized eligibility screening tool. Second, percentile-based thresholds can be embedded in regulatory guidelines to improve transparency and predictability in subnational borrowing decisions. Third, the framework may be periodically recalibrated to reflect macroeconomic changes, evolving fiscal rules, or sectoral priorities. Furthermore, the framework functions as an incentive mechanism for subnational governments. By linking loan eligibility to measurable fiscal performance and governance quality, it encourages improvements in revenue mobilization, debt management, and institutional capacity. Over time, this may strengthen subnational creditworthiness and reduce contingent liabilities for the central government.

Beyond Indonesia, the proposed framework offers broader relevance for developing countries facing rapid urbanization under constrained fiscal space. The integration of fiscal discipline and urban growth considerations provides a scalable and adaptable approach to sustainable infrastructure financing. Future studies may extend the framework by incorporating dynamic panel data, conducting sensitivity analysis on weight assignments, or comparing the performance across different national contexts. Expanding the framework to include climate risk indicators and environmental sustainability criteria may further enhance the applicability in contemporary development finance. In conclusion, this study demonstrates that a composite, rule-based MCDA framework can serve as an effective policy instrument to align subnational borrowing decisions with fiscal sustainability, developmental impact, and spatial equity objectives.

REFERENCES

Badan Pengkajian MPR RI. (2022). *Hubungan-Pusat-dan-Daerah*.

Faoziah Sifah, & Rifqi. (2025). Peran Pemerintah dalam Perekonomian Indonesia: APBN, Fiskal dan Moneter. *Lentera Demokrasi: Jurnal Ilmu Sosial, Politik, Hukum, Ekonomi Dan Pemerintah*.

Gaspar, V., Jaramillo, L., & Wingender, P. (2016). *WP/16/233 Political Institutions, State Building, and Tax Capacity: Crossing the Tipping Point IMF Working Paper*

Fiscal Affairs Department Political Institutions, State Building and Tax Capacity: Crossing the Tipping Point.

Juričić, D., Vašiček, D., & Drezgić, S. (2020). Multiple criteria decision analysis of public investment options: application to streetlighting renewal projects. *Economic Research-Ekonomska Istrazivanja* , *33*(1), 3288–3306. https://doi.org/10.1080/1331677X.2020.1763820

Liu L, & Tan, K. S. (2009). *Subnational Credit Rating: A Comparative Review*. http://econ.worldbank.org.

Liu, L., & Waibel, M. (2010). Managing Subnational Credit and Default Risks. *The World Bank Poverty Reduction and Economic Management Network*.

Oates, W. E., Galli, E., McLure, C., Padovano, F., Rosen, H., Wallis, J., & Wildasin, D. (2006). *On the Theory and Practice of Fiscal Decentralization*.

OECD. (2020). *Cities in the World*. OECD Publishing.

Qian, Y., & Weingast, B. R. (1997). Federalism as a Commitment to Preserving Market Incentives. In *Journal of Economic Perspectives* (Vol. 11, Number 4).

Ussa'diyah, N., & Vidriza, U. (2022). PERAN PINJAMAN LUAR NEGERI DALAM APBN PADA PEMBIAYAAN PEMBANGUNAN DI INDONESIA. In *Journal Of Development Economic and Digitalization* (Vol. 1, Number 1).

Wibowo, A., Penelitian dan Pengembangan, B., & Pekerjaan Umum dan Perumahan Rakyat, K. (2016). *PERKEMBANGAN TERKINI DALAM PEMBIAYAAN INFRASTRUKTUR YANG MELIBATKAN PARTISIPASI BADAN USAHA*.